GEOGRAPHY,
RESOURCES & INDUSTRIES

SEP 30 1940

EDISON ELECTRIC INSTITUTE BULLETIN

SEPTEMBER, 1940

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EDISON ELECTRIC INSTITUTE

THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

June, 1940

CLASSIFICATION OF SALES (Revised Series)

	1940	1939	%
Number of Customers as of JUNE 30th			
Residential or Comestic	24,458,735	23,623,358	+ 3.5
Rural (Distinct Rural Rates)	667,671	599,736	+11.3
Commercial or Industrial:			
Small Light and Power	4,253,032	4,182,682	+ 1.7
Large Light and Power	179,621	186,179	− 3.5
Street and Highway Lighting	24,024	24,941	.....
Other Public Authorities	86,994	77,205	.....
Railways and Railroads:			
Street and Interurban Railways	206	223	.....
Electrified Steam Railroads	28	31	.....
Interdepartmental	1,250	1,128	.....
Total Ultimate Customers	**29,671,561**	**28,695,483**	**+ 3.4**
Kilowatthour Sales During Month of JUNE			
Residential or Domestic	1,798,205,000	1,626,418,000	+10.6
Rural (Distinct Rural Rates)	207,881,000	213,826,000	− 2.8
Commercial or Industrial:			
Small Light and Power	1,799,335,000	1,687,604,000	+ 6.6
Large Light and Power	4,826,596,000	4,160,064,000	+16.0
Street and Highway Lighting	129,896,000	127,925,000	+ 1.5
Other Public Authorities	215,060,000	209,812,000	+ 2.5
Railways and Railroads:			
Street and Interurban Railways	293,445,000	300,074,000	− 2.2
Electrified Steam Railroads	145,663,000	144,248,000	+ 1.0
Interdepartmental	58,400,000	54,674,000	+ 6.8
Total to Ultimate Customers	**9,474,481,000**	**8,524,645,000**	**+11.1**
Revenue from Ultimate Customers	**$195,745,500**	**$184,451,900**	**+ 6.1**

RESIDENTIAL OR DOMESTIC SERVICE (Revised Series)

Average Customer Data for the 12 Months Ended JUNE 30th			
Kilowatthours per Customer	925	876	+ 5.6
Average Annual Bill	$36.17	$35.65	+ 1.5
Revenue per Kilowatthour	3.91¢	4.07¢	− 3.9

GENERATION FOR THE U. S. POWER SUPPLY AS A WHOLE FOR THE MONTH OF JUNE (000's kwhrs)

	1940	1939	%	1938	1937
Fuel	7,025,179	6,549,080	+ 7.3	5,337,590	6,139,396
Hydro	4,074,522	3,698,860	+ 10.6	3,657,949	3,715,337
Total	**11,099,701**	**10,247,940**	**+ 8.3**	**8,995,539**	**9,854,733**

Vol. 8, No. 9, EDISON ELECTRIC INSTITUTE BULLETIN; published monthly. Entered as second-class matter Aug. 17, 1933, at the post office at Philadelphia, Pa., under the act of March 3, 1879. Publication office, 56th and Chestnut Sts., Philadelphia, Pa. Editorial office, 420 Lexington Ave., New York, N. Y. Subscription rate $2.00 per year in the United States; $3.00 per year in foreign countries.
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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 8 SEPTEMBER, 1940 No. 9

An Executive's Views on Rural Electrification

By N. M. Argabrite

Vice-President, American Gas and Electric Company

An address before the Rural Electrification Conference held at Virginia Polytechnic Institute, Blacksburg, Va., Sept. 10, 1940.

IT would be very difficult to pick an industry which, throughout the years of its existence, has provided more romance than has the electric industry. It seems to me as I look back over the forty years that I have been in this business that I recall one romance right after another. It seems that about the time the glamour of one period was becoming commonplace something else came along to take its place. I recall in the beginning we had a remarkable battle to sell, and to keep sold, the use of the old carbon lamp. We knew nothing about rates in those days; we groped around for some basis upon which to sell our services as a commodity. We thought for a great many years that in selling electricity we could treat it as a commodity, but in due course of time it dawned upon us that we were all wrong and that we had been all wrong from the very beginning. We learned that in our business we do not sell a commodity; we sell a service. We speak of selling a kilowatthour, and yet we know full well when we try to price a kilowatthour that it can be worth a fraction of a mill, or it can be worth as much as a dollar, or even more. There is no such thing as a firm value to be placed on a kilowatthour.

After we had battled the carbon lamp a good many years, the tungsten lamp came to us and the tungsten was, up to that time, the marvel of the age. Here was a lamp that gave many times the light for a small fraction of the cost of the old carbon lamp. In the beginning it was very expensive, but we lived through an enjoyable period watching the tungsten lamp develop and become cheaper to produce and become better until at this time they have evolved for us the wonderful lamp which we all use.

MR. ARGABRITE

About the time that the mazda lamp had taken its place among the general fixtures of life, we received from the developers and the inventors the wonderful electric iron and we worked and worked, and campaigned and campaigned to get that electric iron into every home. It was lots of fun. It was a romance. We built up our load and we began to notice on our output charts the improvements in the hourly curves, particularly on ironing days. That was a wonderful step!

In the early days we felt that it was going to be necessary to have direct current wherever we undertook to sell power, but quite early there came to us the development of the three-phase circuits, and then came the remarkable, highly efficient, alternating current motors. Again our load curve plunged ahead and began to still further straighten itself out. The motor led us into many fields and we learned to apply it and use it for an endless number of purposes and we had a wonderful time getting over from the old high frequency and the old direct current to the three phase. Romantic? Very romantic was this period.

Another thing that came to us and that had a great appeal was electric refrigeration and our public took to it very readily and very rapidly. We thoroughly enjoyed the years in which we were adding refrigerators upon refrigerators to our lines. Household equipment and house services, and the distribution lines in the residential sections began to do more work and in so doing greatly reduced the cost of carrying charges that had to be applied against each kilowatthour of energy that passed out through the system. The demand for the refrigerator grew to such an extent that it is today considered by the general public not as a luxury but as an absolute household necessity. This is true to such an extent that power companies, in many instances, have ceased to handle refrigerators, there being no further development period necessary for them. They in turn had become a household necessity and no longer a luxury.

So with electric cooking, electric hot-water heating, and other household appliances of that nature. We are not today fully out of the development period of that type of load. We still get the thrill of a report now and then of large numbers of electric ranges being placed in the various residences of our communities; but along about this time another very interesting romance in the industry came forward in the form of rural electrification. Rural electrification has been more than an ordinary romance; it has been a real challenge.

Let there be no mistake about it in anyone's mind. Rural electrification, as we know it, would not have been possible had it not been for the development of the great number of uses we have learned to put it to, including the major uses that I have mentioned. For the sake of electric light alone no company could afford to build a line as long as some of the lines we are now building into rural territories. No company could build these lines for any one or any two of the other of the uses I have mentioned. Refrigeration alone would not justify the lines, nor the use of motors, nor the use of ranges, nor the use of any small group of these load-building pieces of equipment. It has only been through the demand in rural sections for all of these services that it has become possible for the power companies to justify the capital expenditures that are being made.

To anyone who has spent very much time in the country or on a farm, and particularly to those of us who are classed as executives, there naturally comes a thrill when we see that through our business and our efforts we are going to take away from the shoulders of the country housewife and the shoulders of the farmer some of the tremendous burdens that they have carried in the past. To anyone who has gone out and helped the farmer pump the water into the trough for his stock, what a wonderful thrill it is to know that you are helping in an industry that is motorizing these pumps. To anyone who has helped to chop wood and to carry it into the kitchen for the housewife or mother with which to feed her stove as she perspires over the meals for the family, to have the satisfaction of seeing that old wood stove pushed aside and replaced by a handsome electric range—that is a real thrill. Think of the electric washing machine, the cream separator, or the dozens of other devices that relieve the farmer and his wife of many of their burdens. What a joy it all is, what a thrill.

You ask me what the executive thinks of rural electrification, how he feels about it all? If you want to know what the executive thinks and you want to understand his views and his sentiments, you must take the executive apart, so to speak, and see just how he works. You must ana'yze his job and learn for yourself just what his job happens to be, and when you know and realize the duties and the obligations of an executive in the electrical business, or when you have a general idea of his duties and obligations, I think you will then realize how he feels on this subject, and furthermore, why he feels as he does.

An executive is first a coordinator; he must fit together all of the parts of his organization and he must see that they function not individually, not alone but as a magnificent whole. It is his duty to see that service is rendered to his public, both urban and rural—service that is satisfactory to that public. It is his duty to see that the obligations of the corporation to the employees and the staff that man the corporation are properly, fairly and justly carried out. It is his duty and his obligation to see that the capital which is invested in his enterprise is properly cared for, that the investors who are sufficiently interested in what the corporation is doing, to entrust their personal funds to that corporation, are justly and fairly treated and that the use of that capital does not go unrewarded.

No other employee of a corporation, I think, has a burden that in any way compares with the burden of the executive. When a young man comes into the employ of a corporation and seeks employment as an accountant, from that time on that employee is thinking about the duty of balanced columns of figures. He thinks almost entirely of the systems and processes through which accounts are kept and reports are made. I would not be so unfair to the accountant as to say that he is not interested in the success of his company, but I do say that the manufacturing of the product, the delivering of it to the customer, and the handling of the company's affairs throughout, the making of decisions of all kinds, do not need to concern the accountant. His job is down the one alley and concerns the carrying out of one function.

Another young man comes into the employ of the company to take up his work as a developer of rural territory. He does not, by the very nature of his job, have occasion to worry about black and red figures in his balance sheets and his financial reports. His job is to develop the rural territory, to cause to be built lines that will supply the prospective users in that territory, and to educate the consumers in that territory in the use of the appliances which in the end will cause the line to become self-supporting. And so it goes with all of the other various employees of the company with the sole exception of the executive. His job, as I stated before, is to coordinate. His job is to see that none of the many things that can and do wreck companies are allowed to happen to his company.

Your executive sees to the organizing of a rural department for his company; he selects a rural supervisor and starts him out with an organization and then waits for results. The results are not long in coming. Little by little a piece of line here and a piece of line there is built and the abutting prospects are attached to the line and service is begun. Your executive is impressed at once with the thinness of business on that line and he presses the rural representatives to build a bigger and a better load upon that line so that the line will become self-supporting, and then he becomes, so to speak, his own devil's advocate. He starts putting on the brakes; he begins to worry a little about the possibility of some of these lines never becoming self-supporting; he begins to wonder if, after all, in his desire to give service to his rural community, he has not allowed his sentiment to run away with his judgment—and no executive is a good executive who permits his judgment to be swayed too greatly by his sentiment.

Your executive wants to build a certain line; he has a great desire to build it; he has been over the territory; he sees the need for electric service in so many spots on that proposed line, and he is inclined to figure very closely, possibly too closely, on the cost of constructing that line. He is inclined to possibly over-estimate the amount of revenue that might come from that line and he asks himself time and again—"Am I endangering the other parties in this equation? Am I allowing this company to drift into a position where parts of it will not be self-supporting? Am I, by making this mistake, reducing the earning power of the men and women who are working for this company, or am I jeopardizing the capital which has been entrusted to me for the purpose of developing this property?" He asks himself these questions time and again and whether he wants to build that line or not, if his better judgment tells him, and the figures prove to him that it is a line which should not be tackled, then whether he likes it or not, he must say to his rural developing man, "No, with the figures before us at this time we cannot take on that investment."

Your executive continues to function as his own devil's advocate. He worries about the possibility of over-selling some of his rural customers who are equipping

themselves on a time payment plan. He realizes that the average farmer has a limited amount of monthly ready cash. He realizes that the farmer cannot afford to pledge too large a part of that monthly cash income to monthly payments on electrical appliances and with those payments strung out over several years. This is especially true of the type of appliance which might be known as the luxury class. The class that is pleasant to have but which does not improve the farmer's earning power nor decrease his expenses. He is very liable to call his rural salesman before him and quiz him on this point: "How many pieces of equipment have you persuaded Mr. Johnson to purchase? What are his monthly installment payments? How many years will that continue? How long must Mr. Johnson continue to make these monthly payments before he is paid out? After all, have you over-sold him? Have you let him in for more than he can conveniently carry? You must watch that. It is really worse to over-sell than to under-sell."

What does your executive see in this over-selling threat that disturbs him? He sees the possibility of a very good consumer becoming almost no consumer at all. He knows full well that it is a much safer plan to encourage the rural customer who cannot pay cash for his equipment to start in a more modest way, put in at first those appliances that are most needed, pay out on them and then later arrange for the purchase of the other appliances, or whatever part of them can be comfortably carried.

All of this may sound like heresy coming from the same executive that has been pushing the salesman to load the new rural lines so they can support themselves, but it is not at all. He has the both problems—load the lines and at the same time do not over-sell any individual customer. Both are very important and both are practically vital. A few over-sales may be the cause of turning a self-supporting line into a non-self-supporting line or even into a real money loser, one which not only does not pay its own share of carrying charges but actually does not pay its out-of-pocket operating expenses.

Your executive remembers some of the miscalculated things he has seen and heard of during the years of his experience. He remembers having seen rural telephone lines going to rack and ruin along the side of the road; he remembers some of the government irrigation developments out west where some ambitious congressman has planned to spend millions on schemes that were to be assessed at so much per year per acre against the abutting farm land and time has proven that no such burden can be carried by those acres and the whole thing has had to be written off as an over-sold job. Some of those schemes would have ruined every farmer in the neighborhood, had the promoter's plan been enforced. These things are what is known as derelicts or dead investments and your executive has a horror of ever having any of these derelicts laid on his doorstep. If he permits it, he is almost convicting himself of not being a good executive.

It is unfortunate that some people try to insert politics into the development of rural electrification. Politics has no place in a matter of this kind. If our rural territory needs developing and, if it needs developing so badly that the Federal government should help out in the development thereof, then that becomes not a political question but a social question. I have no quarrel with the Federal government or any state government even subsidizing lines where a regular power company cannot afford to go, if that is the wish of our people. I do not think it would become me to either be for or against such a development or such a procedure, but I do resent very much an effort to inject political lines of thought into this subject.

I have from time to time heard statements made to the effect that this or that power company was taking only the "cream." I have heard it said that such and such a power company was building "spite lines" or "spite fences." It may have been said of some of the executives within reach of my voice today and, if it has, then my message to them is that I have no patience with such talk. Men who act as executives for large investments have not time to build spite fences or spite lines. Furthermore, I have no patience with this talk of "cream" and "skimmed milk." I know of very few rural lines that could be classed as "cream." I have seen a great many which I would not want to rate even as "skimmed milk," speaking from the standpoint of their ability to carry the investment made in them. Most of them are built on very, very thin margin and it is part of the thrill to take those lines that are built on thin margins and by careful work bring them ultimately to a point where they will stand up and take their share of the burden. Most of the talk about "skimmed milk" and "cream," etc., comes from people who don't know very much about the electrical industry—people who do not realize that a bad investment made by a power company in a distributing line is not just a loss of that amount of capital; it is a continual loss from that time on, and herein lies the great danger of some of the things that are taking place today.

If a line is a bad investment, then it is also a bad possession, regardless of the original investment. A company might be offered a line at no first cost to the company, but that is no reason to feel that the company can afford to accept that line, even as a gift. A line may have cost $10,000 and may be offered to a power company for one dollar and yet it may be impossible for the company to entertain for one minute the taking of the line. The reason is very simple. That line may work and do its duty for four or five years without causing much expense to the company that is operating it, but sooner or later the signs of depreciation must begin to appear, that constant upkeep, that constant replacing of the parts until at the end of twelve, fifteen or eighteen years the entire line will have been or will have to be replaced. The line may have cost $10,000 originally and may have come to the power company for $1.00, but at the end of fifteen or eighteen years the company will have invested another $10,000 to cover the depreciation, the wear and tear which has taken place during the life of that line. It is conceivable that that line may have never earned anything like its depreciation cost to say nothing of the other many costs.

We hear a great deal of talk about what this or that line is going to cost and about what the prospective revenue to be derived from the line amounts to and that the prospective revenue may be 1½ per cent of the cost of the line per month or some other amount. Many of those doing the talking think only of the cost of amortizing the investment in that line and that line alone. The people who think along such lines seem to forget that the consumer who is using electric energy out in the far distant section of the country is using a part of an investment in power houses, transmission lines, substations, distribution systems, office buildings, and so on and so on, and is using his share of the services of all of the big organization of the power company that is serving him; the taxes,

the insurance, and the many other costs, and all of these things must be considered in measuring the burden placed upon the company by such a consumer.

What does the executive think about this rural electrification that is taking place? What are his feelings with reference to this development? How much of his own time does he give to this subject? Is he interested in pushing it? This rural development is to the executive a continuation and a part of the romance of his industry that he has been so thoroughly enjoying all these years. How much time does he give to it? If everything is running all right and the rural department seems to be getting along and without his help, he is likely to give very little time to it, but, if things are not running all right; if the development is not taking place as fast as he thinks it should; if the lines being offered and built are not self-supporting; if he has a feeling that some of the customers on the lines are being overloaded; if any part of the function of that department seems to not be properly clicking, then he is likely to give quite a large amount of time to it until it is clicking. The executive as a coordinator is very much like a mother with a group of children. She will give the most time to the one who is in trouble or the one who is sick and the least time to the one who is self-sustaining and going along in good condition. That is so, naturally. It is part of the executive's job to do just that.

I have been asked by theorists if I were "social-minded," this with reference to rural electrification. I am not sure that I know just what my questioner meant by my being "social-minded" about rural electrification. If he meant to ask me if I were willing to misappropriate other people's funds in the building of lines which had no business to be built except that I wanted to see them built for social reasons, then I must say that I am not "social-minded." I have no right to be "social-minded," if that is what is meant and I would be no friend to the people living in the rural sections, if I were that kind of "social-minded." It would simply mean that the day would come when my responsibilities along that line would be lifted from me and put into the hands of some one who did not let his sentiments get the better of his judgment. If they wanted to know whether or not I was sufficiently social-minded to want to see a farmer have all the advantages possible and all the comforts of life that could be given to him; all of the fair play that he should be entitled to, then I am thoroughly "social-minded."

I think I know the substantial farmer. I have lived with him and I have worked for him and I think he is quite a fair business man and that he is by and large a just man. I think that he wants to stand on his own two feet. I don't believe the substantial farmer—the real farmer, a man who makes his living from the soil and by sweat of his brow—I don't believe that man wants charity or anything in the nature of charity. I think he wants just what is coming to him. He wants to be treated fairly and, if you cannot afford to build a line to that man's house and you are honest with him and show him why you can't do it and can convince him of your problem, I think that quite generally he would be satisfied and not ask you to do what you could not and have no right to do.

Promotion of rural electrification is just as much the ambition of the executive as either the tungsten lamp, or the electric iron, or the new motor when it came. It is just as much the ambition of the executive as was the refrigerator and the electric range and the water heater. It all goes to build the load; it all, put together, makes the average for the whole cheaper, better. The executive is not interested in throwing away his company's capital and he is not interested in any philosophy whereby it should make the city dweller support and carry on his back the burden of the rural dweller. He is not in any way interested in that. He has no right to be interested in that, and the very regulating commissions which may be encouraging him at this time to go forward with a rural program would be the first to rule against him when he tried to pass any burden to a place where it does not belong. Thank goodness he does not have to do that. Thank goodness he does not have to pass the burden of the rural dweller on to the city dweller. The cost of building rural lines has been worked down by experiment and by research to a point where we can go long distances in comparison to what we could have gone some years ago. The many uses to which electric energy is now put, uses which in many instances will improve the farmer's earning power, makes it possible to saturate those lines to a point that was unheard of a few years ago. The great quantity production of electric energy, the modern steam turbines, the greatly increased efficiencies, and the saturation of the transmission and distribution systems have made it possible to give service to a very large percentage of those in the rural areas who care for service. It must not be handled carelessly or the executive may get into trouble. By careful handling, proper financial analysis, by doing just the things that he ought to do, leaving undone those things which he ought not to do, sticking to good, clean business principles, he can still go on with his dream and speed up the loading of his property and get his wonderful service that he is so proud of furnishing to the city dwellers, out to the homes of the rural dwellers.

Progress Toward Production of New EEI-NEMA Standard Distribution Transformers

LAST February the date of availability of the new EEI-NEMA joint standard distribution transformer in sizes 25 kva and below and 15,000 v, and below was set for July. However, only one or two of the manufacturers and these in only a few specific sizes, have been able to approximate this goal. Although strongly desirous of realizing early deliveries, the manufacturers explain that this present delay is unavoidable on their part because of the necessity of first reasonably consuming the substantial stocks of conventional transformers built up in anticipation of heavy spring purchases in 1940, but which purchases have been much under the usual rate. Nevertheless all the manufacturers give assurance of diligence in production at the earliest practicable time consistent with reasonably minimizing losses on transformer stocks and stock parts.

An opportunity for reviewing the status of progress toward regular production was had in Lenox, Mass., on Aug. 23, on the occasion of a meeting of Transformer Section, NEMA. At that time, a conference was held between representatives of all transformer manufacturers and members of the Joint Committee on Standards for Distribution Transformers, for the purpose of

(*Continued on page* 441)

Some Observations on 37 Employee Information Programs

THE OBSERVATIONS in this article are based on a study of the employee information activities of thirty-seven operating companies, approximately representative of the industry. These companies, all of which were known to engage in employee education to some extent, were invited to report their activities, to submit samples of the prepared material used and to comment on the observed results. The programs were then analyzed and compared in a search for guideposts that might be useful to other companies in formulating new programs or revising existing ones.

The instruction offered by these employee information programs is, broadly, of two kinds. The first, general training, includes such topics as information about the company, specific customer contacts and relations, public relations in general, problems of the industry and rates; its purpose is to raise the employee's efficiency by making him a well informed representative and to improve his morale by enabling him to take a more intelligent interest in company and industry affairs. The second, job training, tutors the employee in the particular skill required by his job or a job to which he may aspire; the objectives here are a more specific efficiency, help to the employee and the advantage of having such skills immediately available within the organization.

General Training Courses

Thirty-three of the 37 reporting companies conduct general training courses in addition to distributing informational material (folders, booklets, bulletins, etc.); the remaining four hold occasional conferences and use some prepared material. A tabulation of the subjects taught in the 33 courses ranks them as follows:

Subject	No. of Companies Teaching
Customer Contact	29
Information about Company	21
Problems of the Industry	13
Public Relations, General	12
Rates	8
Misc. important subjects	10

That the first rank of "Customer Contact" in this list is far from accidental is indicated in the text of the lesson material used and in the comments of the company officials who have charge of the training courses. They emphasize that customer relations is integral to efficiency and that it is the one continuous, unavoidable phase of public relations. Sixteen of the 29 companies teaching Customer Contact in training courses limit this instruction to those employees having regular contact with the public in the course of their duties; but an almost equal number, 13, extend it to all employees.

Closely allied to "Customer Contact" and ranking next on the list with 21 companies teaching, is "Information about Company," another subject in which public relations is a consideration. Twenty companies admit all employees to classes or conferences on this subject; only one limits the instruction to public contact employees.

The third place shown for "Problems of the Industry" is probably not an accurate measure of the relative importance given this subject by the managements, because the instruction material submitted shows that industry information often is included in the instruction classified as "Information about Company." Similarly, this latter subject often covers all or much of the ground assigned by eight companies to "Rates"—although there appears to be a growing trend toward special courses on rates and rate structures. One company teaches "Problems of the Industry" to public contact employees only, and one limits "Rates" instruction to this employee class; the other companies admit all employees. There is overlapping of subject matter also between "Customer Contact" and "Public Relations, General," on which nine companies offered instruction to all employees, two to public contact employees, one to "key" employees only.

Employee Manuals

In addition to the lesson material used in training courses, 25 of the 37 companies distribute employee manuals or bulletins serving the purpose of manuals. In comparing the list of these with the tabulation of training courses, consideration should be given the fact that in some companies a particular subject is assigned both a manual and a training course, while in others only one of the two means is used.

Kind of Manual	No. of Companies Using
Information about Company	20
Customer Contact	14
Problems of the Industry	6
Public Relations, General	3
Technical handbooks for contact employees	9
Rates	5
Series of bulletins (varied subjects)	4

Other Media

Thirty-one companies distribute miscellaneous informational material or display it for employees' benefit.

Type of Material	No. of Companies Using
Company magazine	27
Slide films and moving picture films*	19
Bulletin boards	12
Company annual report	8**

*Includes slide film on Customer Contact prepared by Vocafilm Corp.
**Includes one company which furnishes employees with excerpts only.

A reservation should be made on the comparatively low ranking of bulletin boards; general observation indicates their use is almost universal, and it is quite possible that some companies overlooked reporting them.

Job Training

Twenty of the 37 companies conduct job training courses. Five of these teach only technical subjects; six, only commercial subjects; five, both technical and commercial; while five curricula include subjects of a general nature, not closely identified with particular jobs but expected to increase the employee's value to the company and further his chances for advancement. Fifteen companies depend wholly or partly on outside schools (commercial, technical or general evening) for training of this kind and encourage or aid employees to enroll for various courses. In technical subjects, this sometimes involves collaboration between company and school in the preparation of courses and the supply of equipment.

Organization and Methods

In the organizations set up to conduct employee training and in the detailed methods of instruction adopted, the reporting companies have been guided by

their individual needs. The 37 programs are therefore as diverse in these respects as the companies themselves are diverse in size, management and operating conditions.

The employee information organization of Company No. 10 is topped by a general committee of executives, headed by the president and including all division managers. Division committees are composed of department heads, each committee working with an employee appointed as division sponsor. Actual conduct of instruction meetings is the responsibility of group leaders.

Company No. 8 has as part of its Personnel department an Employment and Training office, which supervises and advises on job training, directed by operating department heads, and on general training, conducted by group organizations of employees. Company No. 8 has approximately 225,000 meters and Company No. 10 some 350,000. Both programs are comprehensive in subject matter.

Company No. 29, serving approximately 150,000 meters, which has had a program since 1905, delegates to an Educational department the arrangement and supervision of a program of monthly meetings of employees presided over by the heads of the operating departments. A similar organization is that of Company No. 36 (150,000 meters), in which an Employee Training division designs programs to meet specific needs as they develop in operations.

Company No. 23 (400,000 meters) has no regularly constituted department for employee education and conducts no courses, relying mainly on distribution of printed material. But it does find need for its own kind of group conferences.

"From time to time various problems arise which affect the company as a whole but which are so complicated and involved that the use of the above methods for the dissemination of information are not practicable. On such occasions one of two methods is followed: either key people are selected from the field organizations and brought to the general office for a meeting at which the problem is thoroughly discussed, these people then returning and conducting similar meetings among their own groups; or members of the general office force visit the various groups in the field and discuss the problem with them in meetings specially arranged for such a purpose."

Of the 33 companies conducting general training courses, 31 assemble their employees in conference groups, where the subject matter is freely discussed, rather than lectured on, and active participation by the employees is encouraged. Only two companies use the more formal classroom technique. In job training courses a combination of the two methods is often used.

The comment of Company No. 8 is typical of opinions expressed regarding instruction procedure:

"Obviously training in employee customer relations should be designed to bring about changes in mental as well as in mechanical processes, which means that employees must be taught not only *how* to improve their public contact work, but that they must also be sold on *why* the suggested methods are better than the old ones. . . . It is our opinion that the conference or discussion method, with actual cases being used for instruction purposes, is probably the most effective technique for this purpose."

Company No. 21 keeps its plan flexible, introducing modifications when they seem desirable.

"The original plan for group discussion meetings required a group to be composed of employees of different departments on the theory that the varied experience thus made available would be of benefit to all concerned. Experience proved that this arrangement was very satisfactory in achieving the ends desired, but presented certain operating difficulties in those departments which had definite schedules to maintain. Today in most districts, groups are composed of employees of one or two closely related departments, and the variety of experience desired has been secured, to a certain extent, by bringing in supervisors from other departments. The most recent group discussion meetings have been open discussions. These groups are led by the employees' own supervisor, who uses this means of introducing to his employees any changes of practice or routine that concern their work. This method provides for a thorough understanding of such changes in advance of the time they are put into effect. Most of the subjects of these meetings, however, are chosen by the employees in the group. They are free to ask questions and to discuss any phase of the Company's business. Under such a plan it is not always possible to secure the information desired by the employees during the meeting, but when that condition arises, the group leader makes sure of getting the information together in time for the next group meeting."

In both intensity and extent the courses of instruction offered in the programs vary all the way from informal talks by officials and verbal discussion by groups to series of regular meetings extending over many months and using voluminous text material. Through a course of the latter kind, Company No. 27 offers all its employees an opportunity to know the company's entire system almost as intimately as do the engineers who planned and built it.

Most of the prepared material used as text in the general training courses and the handbooks and bulletins has been originated by the individual companies and developed to meet the particular problems of each. This material is often supplemented by reprints of pertinent speeches, magazine articles, etc., and by the films previously noted.

One Program

Although no one employee information program can fairly be cited as typical, that of Company No. 28 is interesting because the company is about medium in size (225,000 meters) and the program itself, which is neither meager nor elaborate, parallels in its features the plans adopted by many other companies. The following outline has been extracted from the complete review provided by the president:

"Employee information and employee education is a matter of major concern with us and we constantly give it our best attention.

"For several years, we have mailed out to each employee our regular annual report to stockholders. Generally, supplementary thereto, we mail out a letter personalizing mutual problems and furnishing such additional information and interpretations as will assist them in rendering a continuously improved and more intelligent service.

"We have a monthly publication which goes to each employee and which is designed for giving information to the employees and stimulating employee morale. By scanning these you can see that we touch employee relations from many angles—information, education, stimulation of enterprise, recognition of meritorious efforts and accomplishment, and cultivating sound attitudes.

"We have mimeographed and made available to every employee a history of the company.

"When special occasions arise, we often find it necessary to furnish material based on the problems incident to such occasions.

"We have a divisional organization here comprised of five divisions. These set up a program designed for employee education and instruction. Broadly, we term this program 'Personal Development.'

"One of the primary features of this activity is a 'Know Your Company' course. This consists of a series of evening meetings, ordinarily monthly, which are actively promoted and conducted by the employees themselves. The employees attend voluntarily to hear discussions on Company problems by Company officers and department heads. Illustrative of the subject matter we list: Company History and Financial Structure; Power Supply and Distribution; Line and Service Departments; Commercial and Suburban Departments; Accounting, Credits and Collections; Budget, Corporate and Statistical; Purchasing, Advertising, and Personnel. These meetings are held at centrally located assembly halls and are well attended. Pictures, charts, skits, papers and numerous speakers maintain diversity of presentation and sustain interest.

"Some of the divisions also have organized speakers' clubs, at the meetings of which employees again conduct their own programs. These meetings take the form of dinners, and experts are invited to advise, suggest and criticize the public speaking of employees.

"Another activity which has created a great deal of interest, particularly to those in the operating departments, is a course in 'Practical Electricity.' Instructions are handled by active employees with a proper background and actual laboratory methods are pursued.

"Courses in accounting are also taught by qualified employees in groups of ten each and are conducted throughout the year. Attendance, of course, is voluntary but it has been very, very good.

"Telephone technique has also received the attention of our educational program.

Test apparatus with which groups can listen to others speak and also hear their own conversations repeated to them, has been obtained from the local telephone company and used to good advantage throughout our territory.

"A plan which has proved very effective in obtaining new business is our 'Employee Cooperative Plan.' Under this plan all the employees are organized into teams with team captains for the purpose of obtaining new business and disseminating information relative to company problems. Tips on new service and new merchandise sales have reflected very favorably by increased business. A bulletin board is provided on which each team's score is registered each month. New and interesting material regarding company problems and development is frequently mailed by the employees through their teams to the homes where all members of the family can read it.

"A Customer Contact film consisting of a series of five units produced by the Edison Electric Institute is being shown to all employees. Thus far it has circulated in four of the five company divisions. Meetings are arranged with department heads in a locality to view the films. Subsequently the films are shown by them to the employees under their jurisdiction."

Employee Reaction

The response of employees to information programs is generally favorable, in the opinion of most of the executives. Company No. 4, however, terminated its general training courses after two years partly because "we sensed that the interest of the employees began to wane.

"We also felt that this activity was not reaching the large percentage of our employees who needed it most. From our experience, we have concluded that this is the major defect in any employee educational scheme of a general nature. If the scheme involves voluntary attendance, study and interest, the response will come from the loyal and conscientious section of the total payroll, and the movement is ignored by the indifferent type who are most in need of the benefit of such training."

A few other companies made similar comments. The official reporting for Company No. 25 believes that the time classes are held is an important factor in employee interest.

"We have tried several different information programs. Frankly, they have not been very satisfactory due largely to the fact that they were not held on company time. From my own experience in these things I believe it is useless to attempt training programs unless the employer can afford to hold them entirely on company time. In that way the program becomes a part of every employee's assignment. Otherwise the very people who most need the training work will absent themselves from the classes."

And Company No. 31 (100,000 meters) reports:

"It seems to be the general feeling amongst our supervisory staff that a program of this character, to be successful, must involve group meetings of employees, held on company time. It is felt that booklets, while of some service, cannot be fully successful unless followed up by such meetings. It is further presumed that such meetings, under the present labor laws, must be held on company time."

But Company No. 16, which holds its classes entirely at night, says: "We have found that the employees appreciate the opportunity to better themselves and, of course, that is likewise beneficial to the company."

Of the total of 33 companies conducting general training courses, 17 held classes or conferences on company time, 14 on employee time; two use part company, part employee time. In job training courses, the division is: company time, seven; employee time, 10; part company, part employee time, three.

Results

No tabulation of results under simple "good" and "bad" headings is possible. Most of the managements believe that their employee information activities have brought benefits to them and their employees; no company, evidently, considers its efforts in this field a waste of time and money.

Company No. 5 (over 500,000 meters) has had a large and comparatively expensive program in operation since 1932. It concludes:

"On the whole, we believe that the training and educational program we have developed meets our particular needs with an equitable distribution of costs to the Company and to the employees; and that, at the same time, it does not preclude the development of any reasonable training and educational program we may decide to adopt in the future. This year, over 3,500 employees will have availed themselves of the out-of-hours classroom facilities, and the demand for the advisory services of the Bureau is constantly increasing."

Company No. 29 (150,000 meters) also has gone into the field extensively and its experience began 35 years ago.

"The degree of success which we have achieved is, undoubtedly, due to the fact that the company has been endowed for many years with a management which has sensed the problem and has personally assisted in the promulgation of a continuous program to meet it. The results of the work cannot be evaluated on the balance sheet, but we are quite satisfied that we have been making a wise investment."

Company No. 4, already quoted as feeling that employee interest did not justify continuance of general training courses, still maintains job training but relies on printed material for general information.

"We have concluded that the best means of informing employees of company policies, and stimulating them along the lines of improving customers' attitude, is by general distribution of printed information. To this end, we publish a weekly tabloid news sheet, containing a newsy combination of employee affairs, political developments which concern the industry, suggestions for improvement of our service, answers to employees' suggestions, etc. We know that this sheet reaches each individual in our employ, and we try to make it sufficiently interesting to attract the attention of the individual."

Sound-Slide Films for Foremen's Training Courses

A SERIES of six sound-slide films on Supervisory Relations, recently completed by the Vocafilm Corporation under the guidance of an advisory committee of the National Association of Manufacturers, is intended to provide a nucleus for a complete training course for foremen. Based on case-history situations common to plants of all types throughout the country, each film treats one phase of the foreman's job as a supervisor. The material is dramatized under authentic shop conditions, thus translating theory into terms of action a foreman will understand and appreciate more readily than he would lectures or printed rules. Ineffective procedures are compared with effective ones, and principles of action are interpreted in a way to make the foreman see how they may be applied to his own job.

Supervisory problems are grouped as follows:

1. The Foreman as a Manager: "The Balanced Job."
2. The Foreman as a Leader: "One by One."
3. The Foreman as a Teacher: "When Something Goes Wrong."
4. Letting Men Know: "The Guessing Game."
5. Handling Grievances: "A Stitch in Time."
6. Proper Use of the Reprimand: "The Right Medicine."

The makers recommend that the conference, or group discussion method be used in training. Each film, running fifteen minutes, will thus serve as a springboard for discussion of the basic topic it outlines. To aid in this procedure, supplementary material is provided for the use of the conference leader. It consists of six discussion manuals, suggesting in detail many ways in which a group discussion can be directed and providing a check list of questions on which the leader may prepare himself; a Leader's Guide, outlining the main functions of the leader and methods for conducting meetings; a comprehensive bibliography of books and magazine articles pertinent to the six topics of discussion, and a supervisor's notebook, tabulated in record form, with working reminders of the points brought out in the films.

The series has been planned to fit into any training program, new or established. Inquiries should be directed to the Vocafilm Corporation, 424 Madison Avenue, New York, N. Y.

PRIZES AND AWARDS

to be administered by the EDISON ELECTRIC INSTITUTE and awarded in 1941

Prizes to Individuals

For Papers on Subjects Relating to the Electric Light and Power Industry

FORBES PRIZE . . . . . *Public Relations*

A cash award of $250 donated by Mr. B. C. Forbes, Editor, *Forbes Magazine*, is offered for the most meritorious paper dealing with the subject of Public Relations in the Electric Light and Power Industry.

McGRAW PRIZES . . . . . *Engineering*

Cash prizes of $250, $150 and $100 donated by Mr. James H. McGraw, Honorary Chairman, McGraw-Hill Publishing Company, are offered for the three most meritorious papers submitted on any Engineering or Technical subject relating to the Electric Light and Power Industry.

RULES AND CONDITIONS OF CONTESTS FOR ABOVE PRIZES TO INDIVIDUALS

Any person employed by an electric light and power company is eligible to enter the competition. No person is eligible to win two years in succession the identical prize or lower prize of the same award, but is eligible for a higher prize of that award. Papers must be the original work of the author or authors, prepared exclusively for this competition. Papers may be of any length, and pen-and-ink drawings or photographs suitable for reproduction may be included. Papers should be typewritten on one side only.

The first page of the manuscript must give the following information: the name of the prize for which the paper is submitted, title of paper, name of author, name and address of employing company, title or character of position and home address. One paper may not be submitted for more than one prize.

Papers not receiving awards will, upon request, be returned to contestants after the awards have been announced at the 1941 Convention of the Institute. Prize winning papers will be available for inspection at the general offices of the Institute.

Papers for above prizes must be forwarded, in duplicate, by March 1, 1941

Awards to Individuals

For Accomplishments or Acts as Specified

R. B. MARSHALL AWARD

Electric Range Salesmanship

A cash award of $500, donated by Mr. R. B. Marshall, President, Electromaster, Incorporated, is offered in five prizes of $100 each to the public utility company representatives in five classifications, according to the number of customers served by the companies, who sell, lease or rent during the calendar year 1940 the greatest number of individual domestic electric ranges of a rated capacity of five kilowatts or more.

CLAUDE L. MATTHEWS AWARDS

For Valor

For acts of devotion to duty by public utility company employees wherein outstanding courage has been shown in efforts to maintain important electric service or to restore service in the shortest possible time, three cash awards of $150 each are offered for the year 1940 by Mr. Claude L. Matthews, Vice President, W. N. Matthews Corporation. A citation and an appropriate lapel decoration will accompany each cash award. Recommendation for the award must be submitted by the President or acting executive head of the company in which the person recommended is or was employed, and it is urged that such recommendation be submitted as soon as convenient after occurrence of the act of valor.

Statements substantiating entries for above awards must be forwarded, in duplicate, by March 1, 1941. Complete details concerning the R. B. Marshall award and the Claude L. Matthews awards should be obtained from the Secretary, Edison Electric Institute, 420 Lexington Ave., New York, N. Y.

Awards to Companies and Individuals

For Accomplishments in Specified Activities

CHARLES A. COFFIN AWARD

Advancement in Operation and Plant

A gold medal, known as the Charles A. Coffin Medal, donated by General Electric Company, is offered for the year 1940 to the public utility operating company, within the United States, which has achieved the greatest advancement in its operations and physical plant, thereby making a distinguished contribution to the development of electric light and power for the convenience of the public and the benefit of the industry. The company awarded the medal will also receive $1,000 for its employees' benefit or similar fund.

GEORGE A. HUGHES AWARD

Domestic Electric Cooking Load

Three prizes are offered by Mr. George A. Hughes, Chairman, Edison General Electric Appliance Company, Inc., for distinguished contributions made during 1940 by public utility operating companies within the United States to the development of the market for electric ranges through direct or cooperative promotion or selling, or both. First prize: to the company, a trophy; to the individual or individuals responsible, $500. Second prize: to the company, a certificate of recognition; to the individual or individuals responsible, $300. Third prize: to the company, a certificate of recognition; to the individual or individuals responsible, $200.

AUGUSTUS D. CURTIS AWARD

Lighting of Commercial Buildings

Certificates and cash prizes, donated by Messrs. Darwin Curtis and Kenneth Curtis of Curtis Lighting, Incorporated, in memory of Augustus D. Curtis, are offered for distinguished contributions by public utility operating companies toward the advancement of higher levels of illumination in the interiors of commercial buildings during the twelve months ending March 1, 1941. First prize: a certificate to the winning company and $200 to the individual responsible for the achievement. Second prize: a certificate to the company and $100 to the individual responsible. Third prize: $50 to the individual responsible for the achievement. Fourth prize: $25 to the individual responsible for the achievement.

THOMAS W. MARTIN AWARD

Rural Electrification

A bronze plaque is offered by Mr. Thomas W. Martin, President, Alabama Power Company, to the public utility operating company within the United States which during the year 1940 has shown the greatest contribution to agricultural advancement within the company's territory through promotion of uses of electricity, development of rural load, cooperation with other agencies, extension of rural lines, organization and planning for development of rural electrification.

LAURA McCALL AWARD

Achievements of Home Service Departments

An engraved plaque, two illuminated parchments and a total of $175 in cash, donated by *McCall's Magazine* in memory of Laura McCall, are offer. l for outstanding achievements by the Home Service departments of operating public utility companies in the advancement of electrical living in the home through the promotion of electrical appliances and home lighting equipment. Companies winning first, second and third prizes will receive, respectively, the plaque and the parchments; the Home Service Directors or the directing heads of the Home Service departments reporting the achievements will receive the three cash prizes, which are $100, $50 and $25. The contest period is the calendar year 1940.

Presentations of accomplishments must be forwarded by April 1, 1941. Only the achievements of companies which compete for the awards will be considered by the judges. The merit of the enterprise presented in the papers or exhibits will be the prime factor in determining awards, without regard to the size of competing companies.

Elaborate and costly exhibits are unnecessary. Complete details for the Charles A. Coffin Award, the Augustus D. Curtis Award, the George A. Hughes Award, the Laura McCall Award, and the Thomas W. Martin Award should be obtained from the Secretary, Edison Electric Institute, 420 Lexington Ave., New York, N. Y.

Papers and Exhibits for 1941 prizes should be addressed to the Secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y. Winners will be announced and prizes awarded at the 1941 Convention of the Edison Electric Institute

PRIZE AWARDS COMMITTEE: Charles W. Kellogg, James E. Davidson, H. P. Liversidge, *Chairman*, Lewis B. Beatty, *Secretary*

Better Relations Through Personalized Service

PART I

By C. M. Turner

Assistant to Vice President, Ebasco Services, Inc.

ELECTRIC UTILITY methods of operation are essentially different from the methods employed in other industries and therefore require a certain degree of variation in customer and public relations approach. Few, if any, business concerns outside the utility industry produce their product and transport it from the raw state to a usable form in the intimate corners of the customer's home. From the coal pile to the heating pad in the bedroom, from the mountain stream to the breakfast toast, electric service is an operation of only one organization. This organization has a great responsibility to every customer not only because electric service has become an essential to good living and is a necessity which must be kept available 24 hours a day but mainly because the industry has practically moved into and become a resident of the customer's home.

The major differences between our business and others have been recognized for years but the intimate aspect of our service and responsibilities has approached realization only within a relatively short period of time. We are beginning to see what an integral part of the individual's life we are, how close to his well being. We are awakening to the fact that we must *personalize our service.*

The personalized approach is essential because

First, The utility produces, transmits and delivers its service to the very point of utilization; its service is a 24-hour function; and it is one of the essentials of modern life, a personal necessity.

Second, Customers are always conscious and much of the time suspicious of the cost of their electric services. To overcome this consciousness and suspicion it is necessary to explain the composition of the charges for service and to clear up any doubts in the customer's mind.

Third, Electricity is so very impersonal; even the conductors and equipment necessary to utilize this service are generally out of sight. The most noticeable piece of apparatus is the electric meter which the customer has learned to consider as a drain on his pocketbook.

Fourth, The utility business is so technical that it lacks romance; its facilities are such as to lack glamour. The enormous investment necessary to render service is necessarily unappreciated. What the customer sees is but a small part of what is necessary to give him reliable electric service.

Heretofore we have been selling a service. From now on we must sell personalized service if we are to continue to sell at all.

Several operating companies have adopted the Customer Service Program as a means of accomplishing this. The Program, described in greater detail later in this paper, offers a method of making individual contacts, clearing misunderstandings and misapprehension through *personal* attention and *personalized* service, replacing misinformation with facts, explaining Company policy and methods and dispelling the fantasy that electricity is costly. It is tried and seasoned on several utility properties. It is young but not new, and if it has the merit which application to date indicates, it should by all means be put to more general use. It is more expensive than mass performance, but whether it is not cheaper per unit of accomplishment is something which may be determined as we read on.

The advantages of individual customer contact might be listed as

—assurance of attention and serious consideration on the part of the customer. This we could never be sure of in mass coverage programs.

—definite clearing of any misunderstanding or complaints in the customer's home where service is actually used.

—simultaneous performance of a service.

—closer association of customer and employee personalities.

—survey of customer thinking and attitude as a means for determining company policies and methods.

—measure of the effect of the program. A continuous cross-section of company acceptance as a means of guiding the program and the company operations.

—indirect selling of the value of electric service; this for the customer's comfort and benefit and for the company's gain.

The Customer Service Program

Before delving into the details of the Customer Service Program, or into the results so far accomplished, let us take a quick look at what it is and how it functions.

The Program in Brief

Intelligent, personable men of considerable experience, well versed in the policies and methods of the Company and the history of the industry are selected from the personnel of the Company to act as Company Representatives.

Training data are compiled.

The Representatives are given an intensive course of instruction in which every department participates.

Two definite points are stressed:

First, and so important that the success of the plan hinges on it, the representative has no merchandise to sell.

Second, the representative's stock-in-trade is his approach to the customer.

Representatives call in a systematic routing, put themselves at the customer's disposal and

Present customer with analysis of last 12 months' consumption and bill showing average cost per day of service.

Determine "cost per week" to operate each appliance based on customer's statement of hours' use of each appliance.

Answer questions regarding company policies, methods, and operations and concerning the electric industry as a whole.

Make minor adjustments in appliances and report major trouble to service department.

Encourage further contact with company on matters of interest to customer.

After the visit, Representative makes as near verbatim report as possible, fills in summaries of calls made, at customer's request passes to sales department, dealer or home economists any inquiries regarding appliances, and makes out disposal reports for service department.

Supervisor sees that all requests are carried out and that Program functions as intended.

Its Objectives

1. Improve our relationship with all persons with whom we come in contact; make each individual customer a true friend and ally of the Company.

2. Afford a common basis of understanding between Company and customer in order that mutual appreciation of each other's problems will lead to better performance of public service.

3. Provide a real service, be of personal assistance in helping customers

to appreciate and enjoy increased use of their electric service, and to see that adjustments are made to satisfy complaints.

Its Accomplishments

Wherever this program has been established its objectives have been realized. Friends have been made, a better understanding of both customer's and Company's problems has resulted, and a real service has been rendered by the Representative and various departments of the Company all because of the application of a well planned customer contact program.

1. Improving Relations by Creating Friends

"The only way to have a friend is to be one"
—Emerson.

That is the philosophy of the Customer Relations Program. We need friends and we wish to be one.

We can be a friend of each customer by serving him well and cheaply and by reaching a mutual understanding of our related problems, analyzing them and helping to solve them for the customer's benefit. We wish to make it possible for the customer and members of the Company's personnel to know and understand one another, for through knowledge, understanding and association friendship is born.

Personnel—It requires a personality to make friends and corporations as such certainly lack that. They are cold, inanimate things in the general run of minds and only by introducing the personal element into our business are we going to arrive at this mutual understanding which makes friends. Heretofore, we have utilized the human element as a contact only when we wished to read the customer's meter, give him a bill, take his money, or sell him some merchandise. Is it any wonder some people are nearly dumbfounded when our Representative insists he has no merchandise to sell—no pressure to bear?

Here is a portion of a report on one interview:

F. J. P.—Av. 84 kwhr $3.55 per month or 12c per day.
(In—1¼ hours.)
Mrs. P.—"* * * Yes, I knew what you were calling for because I was over at S—'s yesterday when you were there. * * * Mrs. K— was there too and she mentioned that you had been out some time ago and spent some time with her explaining everything to her. *They couldn't get over the fact that you didn't try to sell them anything.* * * * I have been anxious for you to come because we have wondered why our bills are so much higher in this house than they were in the other house. * * *"

Customers often indicate indirectly that the Representative's visit has been successful in establishing a friendship.

Mrs. C. B. W.—Av. 86 kwhr. $3.97 per month or 13c per day.
(In—1¾ hours.)
Mrs. W.—"* * * some time when you are out this way again, just drop in and say 'hello' and let me know how you're getting along. * * * "
W. F. B.—Av. 59 kwhr $2.83 per month or 9.4c per day.
(In—35 min.)
Mrs. B.—"* * * Well, I think it is a good idea for your company to call on its customers because about the only time I have seen anyone from your office is when your service men came or when your meter reader comes. *I imagine that your company has a lot of problems that are of interest to us but we just haven't had a chance to find them out.* * * * "

The feeling toward the Company which a customer may have formed through his association with one or more of the Company's employees in line of duty is not always the best as a reading of many of the Representative's "verbatim" reports will reveal. One Representative in a summary report covering nearly 700 interviews concluded,

"* * * that indifferent or careless or nonchalant behavior on the part of our employees, whether in the field or office, accounted for the majority of the real complaints listened to."

A breakdown of 229 complaints from this group of interviews shows that the largest single item was that of "Personnel"—27 complaints including all Company Departments.

Another Company reporting 15,000 completed interviews shows 2,678 complaints, 103 of which were with regard to treatment—or rather mistreatment—by personnel. A third utility states that in approximately 19,000 interviews, the matter of "Personnel" came up 1,681 times, and in this number were 417 expressions of dissatisfaction. All of which emphasizes the need for continual employee training—more and more instruction in the art of winning friends. This the Company recognizes.

"The most definite benefits (of this program) have been within the organization, in that employees have been shown the need for an effective interest in the customer."

The employee who can elicit the following remark is an asset to the Company:

Mr. C. A. B.—"I like to have that little black-haired girl wait on me when I pay my bill. She always says, 'How are you, Mr. B—?' I can't understand how she can remember my name when she has to wait on thousands every day * * *"

The expressions of many customers with regard to certain of the Company personnel have resulted in the transfer of employees to other jobs and in the recall of service men for further training and instruction in public contact and customer treatment.

Policies—Along with good personnel administration goes good policy administration. Utilities must have policies, must have rules and regulations—these it cannot help. But it can keep the application of these policies and rules so painless that they will cause little unfriendliness. Our survey will show that this may be done by keeping the number of such regulations at a minimum, by applying them fairly and without discrimination, and by conducting their administration in such a way that the customer realizes it is to his benefit to have such regulations.

E. A. S.—Av. 26 kwhr $1.10 per month or 4 cents per day.
(In—20 min.)
Mr. S.—"* * * I was on relief awhile and I expected my lights to be cut off, but they were not. I would go to the second floor and talk to a real tall man. He was very nice. He told me not to worry about it, that everything would be taken care of. They carried me for three months. Didn't even send a man out. A girl on the second floor was very nice, too."
C. W.—
Mrs. W.—"* * * I think my bills are higher than they should be. I have gone into the office to complain and all the satisfaction I receive is some statement to the effect that I must have used the power. Anyway, with government power here, we won't have to wait much longer for low rates."

The Company's reputation, be it good or bad, spreads over the back fence very rapidly. The customers' neighborly relationship crops out in many an interview—that of Mrs. F. J. P. of the first quotation, for instance, or Mrs. W. E. L—, who said "* * * Oh, you're the fellow that was over to Mrs. P— the other day, * * * she was telling me about you. She is a wonderful woman * * *," or Mrs. C. R. H—, who in a 45 minute interview stated, *"My neighbors have told me* that my electric bill is just terrible but I really don't think it is, especially so after seeing your analysis of appliance cost * * *."

There is the old bromide that a good defense is the offense. It is for this reason that one of the participating Companies broadened its Customer Service Program to include a call upon each new customer or reconnect. Customers frequently need assistance when moving and a pleasant taste is left where a disagreeable one might have originated spontaneously, had the call not been made. Likewise, the Company has seen fit to turn all customer complaints over to this group of Representatives so that the sources of trouble could be investigated in the homes, thus eliminating pointless arguments with a clerk. Since 75% of complaints received were regarding high bills, this type of handling has been very satisfactory.

2. Understanding—That We May Serve Better

"Understanding" indicates a transaction requiring two or more parties. A misunderstanding can be a creation of either or any party to the transaction.

It is most important that if we as individuals in private enterprise are to continue to serve the public we understand the problems of each of our customers and that they understand our problems, our policies, our service and what it means to them. One of the chief aims of the Customer Service Program, then, becomes the establishment of a mutual understanding.

The Bill—The unconscious use of an invisible service creates fertile ground for misunderstanding. Electric service is intangible. It is delivered and used through no effort on part of the customer and a bill for a month's consumption of something which he never realized having used seems to be a natural irritant to the customer. One Company reports that 60% of the complaints encountered during the interviews pertained to high bills and another reports 76%. How can the customer know whether a bill is high or low if he has no way of understanding or evaluating the service he has used or should use? He still tries to associate his bill with the number of drop cords in the house.

The high bill complaints in the 76% figure were composed as follows:

"Comparison" complaints	26%
Lack of familiarity or misinformation	47
Chronic	12
Real trouble	13
Outdoor meters	2
	100%

The fact that in 13% of the high bill complaints there was real trouble indicates that the Company may be in error occasionally and that the customer is entitled to sufficient time in which to discuss charges. In most cases after an interview the customer is convinced of the fairness of his bill.

As one Representative put it:

"* * * for emphasis, I might add, the *lowness* of his bill was not as important as his conviction of *fairness*, not our taken-for-granted service as important as our eager alertness in rendering good service."

W. E. L.—Av. 72 kwhr $3.39 per month or 11c per day.
(In—1 hour.)
Mrs. L.—"* * * Well, thanks for calling. I guess we haven't got anything to kick about. It is funny how different it looks when you itemize it. * * *"

Mrs. L. B.—Av. 66 kwhr $2.70 per month or 9c per day.
(Porch—45 min.)
Mrs. B.—"* * * You mean my bills only average 9c a day? Who could kick about that? * * *"

The Meter—Along with the high bill there come the subjects of meters, meter reading, and meter readers. The Representative takes time to explain the meter, its delicate but sturdy construction and its accuracy; also how to read the meter if the customer is inclined to familiarize himself with it.

One of the most prevalent complaints comes from a city in the south where many customers, during the interview, referred to the fact that the readers are "sure good" if they can read the meter from "the distances they do."

W. R. S.—Av. 22 kwhr $0.94 per month or 3c per day.
(Yard—30 minutes.)
Mr. S.—"* * * That boy stands on the front pavement and reads the meter and he can't do that no matter how good his eyes are. I saw him do it this way last month. My daughter can't do it. * * *"

The customer interview has brought home to one Company very emphatically the need for more personalized service on the part of the meter reader. That Company states:

"Here is a case where the dislikes exceed the likes. The diagnosis seems to indicate that a little more time taken by the meter reader would make friends for the company."

As a result of becoming acquainted with and understanding a matter which is perplexing and irritating to the customer, such as this one of hasty meter reading, another of the Companies has actually changed its methods:

"The conduct of meter readers in performing their duties has been improved to the extent that they are not permitted to 'stand off' an excessive distance while reading meters. They have also been instructed to take a little more time to answer such pertinent questions which might be asked them from time to time."

This, of course, would work counter to the plans of those Companies paying incentive wages and bonuses to meter readers for volume coverage.

Now and then it becomes necessary to check the customer's meter as a result of the Representative's interview. If there is any question from this standpoint, it is well to have it cleared up at once. Since beginning this Program, the Company serving the southern city in which meter complaints were so prevalent has had its requests for meter tests reduced 50%. This helps at least to pay a part of the cost of the Customer Service Program.

The Name—How we all dislike having our name misspelled! Our Customers are no exception—

Mrs. J. S.—"John (to Mr. S.), this is the man from the power company. Here is a report he brought us. *Yes, and they still spell my name wrong even after you sent in that pink slip.* * * *"

One Company reports 73 cases of name or address correction which, in 15,000 interviews, seems like an insignificant number. *To 73 families, it is important.*

The Corporation—If the newspapers are carrying a corporation "scandal," there are likely to be some questions, comments, condemnations and suggestions regarding holding companies, service companies, "watered stock," and the like. When this is not a particularly current subject, the number of times which these subjects arise is surprisingly small. Some of the questioners are most intelligent and solid preparation with plenty of illustrative material is essential.

B. C. T.—Av. 90 kwhr $3.61 per month or 12c per day.
(In—1 hour.)
Son—"* * * Mother isn't here just now. Maybe I can give you the information. Give me some? All right. How do you know what rate to charge? Do you have some eastern company figure out how much you have to get? Wasn't Blank & Blank a big eastern holding company? Who organized the power company? I'd really like to know. I'm studying law at night and the history of corporations is very interesting. Isn't Blank Company owned by the General Electric Company now? The South has been exploited a good deal by eastern capital. I guess it was a real problem to finance a long time proposition. Who owns your bonds? You don't have a sinking fund to retire them? We don't have a state regulatory commission, but you are pretty well tied up on what you can and can't do. Wasn't Blank Company about the only one that fought the Federal investigation? I don't blame anyone for wanting to protect his interests, especially if they are aboveboard. We lived in Alabama just before the TVA went in there and regardless of who brought the convenience of electric service to those farmers, it is a wonderful thing. It is an economic trend, I suppose, and there isn't any doubt that electric service has done a lot to raise their standard of living. I believe a privately run business is more efficient than one run by the Government. How long have you been with the power company? I guess that is one reason you are doing this work. It must be an incentive to work where there aren't any mysteries in the business and you can get the answers * * * "

Miscellany—In other instances, questions might be raised concerning "overbuilt plant," "high salaries," policies pertaining to deposits, pole locations, discounts or delayed payment charges, minimum charges—ad infinitum. The field offers diversity and experience for the Representative, to say the least.

And so as our Representatives endeavor to correct misunderstandings in regard to these and many other items important in the customer's mind, they, in turn, have had pointed out to them Company practices the results of which were subject to misunderstanding on our part.

For instance, as a result of better understanding on our part employees

have a new view of their job. One district manager reports:

"Undoubtedly the program did put everybody on his toes for it tended to increase the dispatch of repair orders, more promptness, alertness and attention to complaints. Criticism—on personnel, had a stimulating effect on friendliness, courtesy and tact."

The customers willingly point out the irritating things we do, the unnecessary red tape which causes no end of inconvenience, the shortcomings in our personalities and weaknesses in our methods and routine. From them we learn customer likes and dislikes and if we are smart, we will do more of the first and less of the second.

Common understanding of each other's faults and mistakes is the way to friendship. Bulwer wrote:

"One of the surest evidences of friendship that one man can display to another is telling him gently of a fault. If any other can excell it, it is listening to such a disclosure with gratitude, and amending the error."

The Service Program is also a survey of opinion and a search for suggestions. As such, it is profitable not only as an insurance against future trouble and antagonism, but also as a means of reducing current operating costs.

3. Service—That Little Extra Something

Comparative Costs—The avenue of approach to the customer in this interview is in the breakdown analysis of his electric service bill. The customer is given a slip showing his billings for the past twelve months, broken down into average monthly and daily costs. The Representative interprets the daily cost in the form of other more tangible and familiar items of equal cost—cigarettes, theater tickets, chewing gum, gasoline tax—items which make the value received for such a few "electric pennies" seem remarkable.

The acceptance of this little service has surprised many. It indicates the value of customer understanding.

Mrs. L. B.—Av. 66 kwhr $2.70 per month or 9c per day.
(Porch—45 min.)

Mrs. B.—"* * * You say you have my statement for the past year? Now, isn't that nice—shows everything, too. You mean my bills have only averaged 9c a day? Who could kick about that? I thought last month's bill would certainly be something, for we used two fans out here nearly 24 hours a day. No wonder it didn't go sky high, for they are cheap to use. And the iron, I thought it would cost a lot more than that. Take my washing machine, it hardly amounts to anything, but if it did cost 10c an hour, I would still use it. That is the handiest thing I ever owned. You know, I got one of those lights they were bringing around last year. That is the nicest light—why, I wonder how I got along in the kitchen before. It has a little larger globe but that light it gives is worth it. I have not a thing I could kick about. I am even glad I have three deposits up for I get 6 per cent on them, and I don't know where I could get that at any other place. I am well pleased with everything and I am glad to get these statements and everything. Certainly do thank you." Disposition—none.

Mrs. H. E. R.—Av. 90 kwhr $3.61 per month or 12c per day
(Porch—1 hour.)

Mrs. R.—"Yes, I certainly would appreciate that kind of information. Maybe I can stop some of the arguments around here about how much some of these things cost. Now what about my iron? Does it cost 10c to heat? What about the radio? Is that all? Well, how cheap. My bill is only 12c a day? That's mighty cheap compared to $6 a month for ice which I used to pay before we got the box. This has been the nicest thing—for you to tell me all about these things. * * *"

Increment Costs—The plan goes even further. The use of each appliance is evaluated in terms of Company rates based on the number of hours' usage as estimated by the customer. The costs of operating the appliances thus obtained are recorded, summed to approximate the customer's average bill, and left with the customer for further study. It is known that the more the customer reviews these data, the more he becomes impressed with the cheapness of operating an individual appliance.

B.—Av. bill $3.16 per month or 10c per day.
(30 min.)

Mrs. B.—"I have always felt that my service was very cheap. But I am very economical with electricity. In ironing, I only heat the iron once a week as I was told it cost 10c to heat it. I can hardly imagine it costs less than 5c an hour but can understand how you figure the cost, so guess now I can heat for pressing. Our radio isn't working, but since it costs so little, I am going to have it fixed because I really like radio. Then my lights are but a small cost and my husband has a workshop in the back and uses some electricity so taking it all into consideration, I believe electricity is cheaper than anything we use. * * *"

If our Representative has helped the customer to acquire some knowledge of what he received for the monthly outlay on his part and to understand the possibility of making greater use of electricity, the customer invariably considers that we have been of some assistance to him.

H. R.—Av. 52 kwhr $2.94 per month or 9.7c per day.
(In—1 hour.)

Mrs. R.—"* * * How much does it cost to operate one of those electric roasters? I would like to have one but a neighbor told me they were so costly that it would cost as high as $1.00 or so to roast a turkey in one. I am surprised to hear you say it would be so little. This just goes to show how a person can get false ideas about things of that kind and I am glad to have the straight of it. I am certainly going to have one next summer."

Appliances—The Representative may be requested to examine an appliance, a cord, or a lamp to see why "it doesn't work." Many times he can fix it in a few minutes, or if he cannot, he may notify the Company's service department. Other ways of being of personal service also present themselves enabling the Representative to earn the customer's appreciation of the Company's willingness to do that little extra something.

M. L. H.—Av. 106 kwhr $4.90 per month or 14c per day.
(In—30 minutes.)

Mrs. H.—"* * * Last Christmas my daughter bought a lamp and a percolator down there. The lamp is surely a good one but the percolator is not so good. *There must be a short in it or something like that. Every time we plug it in the wall it blows the fuse in the percolator. We had to quit trying to use it. I know the percolators make very good coffee, too. That surely would be nice if you would have someone look it over.* I always thought a washing machine was expensive to operate but I see it's not. It surely was nice of you to explain these things to us. It is very interesting. Thank you." Disposition—*Blue Ticket No. 1110 to M. D.*

Mrs. E. Mac.—Av. 8 kwhr $1.00 per month or 3.3c per day.
(In—20 min.)

Mrs. Mac.—"* * * I sent up to see if I couldn't get a rebate on that charge for August and September, but the men up at the office said they could do nothing about it. Would it be possible for you to check up again and call back and let me know about it?"

(Checked statement with bill, took up with F. L. who authorized me to write off disputed minimum charges. Returned to customer and notified her of rebate on bill. Expressed gratitude for rebate and trouble.)

Mr. and Mrs. G. W. K.—Av. 99 kwhr $4.36 per month or 15c per day
(Clerk, hotel.) (In—1 hour.)

Mr. K.—"* * * Why do we burn out so many small light bulbs in the hotel? It seems like we're replacing globes down there every few weeks. It's only the small ones that seem to burn out so fast. The big ones are all right. We've had electricians over here and your man has been over too, but no one seems to be able to explain it. Yes, we buy good globes, too. Well, let's see, they burn about 10 hours a day. They should burn about 100 days, I think. If you find an explanation for it, let me know. *Could you make me up a set of cards for the electric light, water, and steam at the hotel for the past year just like you have for my personal account?* I'd appreciate that very much. I need information like that for my yearly report. Thanks a lot. I'll let you know if I have any more questions."

Sometimes the customer requests that the Company run a test on his meter or on one of his appliances, and this offers an opportunity to be helpful. Likewise, if the Representative calls back subsequent to such tests, or to the filing of a service request, the appreciation of the customer is amplified.

Call Back Report No. 37.
Believe noise in radio caused by furnace.
Radio man grounded motor to frame which eliminated noise.

"Yes, the man was out and fixed the furnace fan. I'm sure he fixed it right because I don't hear any noise now when the fan goes on. If I have any trouble with it again in the future, I'll call. Thanks."

Increasing Use—The rendering of a service is a satisfaction in itself, and bears an intangible reward. However, helping a customer to gain greater enjoyment from the use of service carries with it a more tangible compensation. Putting into service a broken appliance adds to energy sales as well as to the customer's comfort. Similar results obtain from the fulfillment of requests for improved voltage and regulation.

Some customers have actually requested the Representative, as a favor and a service, to have the Home Economist visit their homes, or to advise a dealer or a Company salesman that they are interested in certain electric merchandise. The Representative must not and does not mention such a sales lead for immediate follow-up except at the customer's request.

R. A. J.—Av. 202 kwhr $6.55 per month or 22c per day.
(In—45 min.)
Mrs. J.—"* * * I want to ask you about something else while you are here. The light company repair department made temporary repairs on my fan at the first of the summer and they said they would pick it up and send it back to the factory this fall, but so far they haven't picked it up. I paid only for the temporary repairs. I wish you would handle that for me. I use these two lamps (IES) in here altogether. I am going to have this center fixture taken out. I don't like it at all. *What kind of shades? Where can I get them? We are going to have the house remodeled next spring and we can use help on both placing the plugs and on lights.* Since you have given me the idea, I'm going down and get a pin-up lamp to put over the sink. I'm glad to get the information and thanks for the suggestion." Disposition—Blue Ticket issued to M. D. L. for repair of fan.

R. A. T.—Av. 270 kwhr $7.91 per month or 26c per day.
(In—1 hour.)
Mr. T.—"It looks like I have plenty of trouble. Did you look at the meter? What do you think about it? Just wondered if you would admit it or make some excuse. It was quite a coincidence. When I called your company yesterday, I asked for the last meter reading. They told me 8100. When I went to the meter to read it, it read exactly 8100. I was pretty mad then. Let's let it stand just like it is. I have paid the bill and, as I see, it was to my advantage to do so. *We have a new cook and I wish someone would come out and instruct her in the use of an electric range.* I surely thank you for coming out and appreciate this information you have given me." Disposition—Blue Ticket 1201 to Home Service Section requesting demonstration of range.

Sales—Transcript reports of individual interviews from many areas substantiate the belief that this Service Program, in its indirect way, is tremendously successful as a sales stimulator. Sufficient experience is not at hand to make positive assertions regarding the use of this Program as a lone sales tool, but as an aid there is no doubt of its effect in selling the use of service as well as its cheapness and value.

W. B. L.—Av. 102 kwhr $3.97 per month or 13c per day.
(In—55 min.)
Mrs. L.—"How do you determine how many kilowatthours I use each month? How would you figure the bill if I used 100 kilowatthours? I understand that now. Would I have any appliance that would be 1000 watts? How many watts is a percolator? What I am trying to figure is why my bills are as much as theirs are. We do a lot of ironing. We have the two radios. My refrigerator is pretty old, I understand the new refrigerators do not cost so much to operate. We have not figured anything for the lighting. Does that cost much? I have overestimated the time I used some of those. That gives me a good idea of what makes the total bill. Yes, this is the kind of information I should like to have. Yes, there is other information I should like. I want to get some help on home lighting. I have noticed your ads but did not know you had a service of that kind. *I'd like to call when I am ready for someone to come out. Also please give me some information on the newer appliances—how to use them and how much they cost to use.* * * *"

As a matter of interest, let us review an analysis which one Company made to determine what effect its program might have on the use of service; just what was the sales value of a non-sales program. This company analyzed four groups of 20 twelve-month customers appearing consecutively on a route which had been served by a Company Representative prior to July, 1939. The August, September, and October, 1939, consumption of these 80 customers was compared to the consumption of a similar period in 1938 thus:

SUMMARY OF KWHR CONSUMPTION OF 80 CUSTOMERS CONTACTED

	1938	1939	Increase
August	6,484	7,290	806
September	7,512	7,539	27
October	6,046	6,762	716
	20,042	21,591	1,549

Increase—7.7 per cent.

Was this increase due to the Customer Service Program, weather conditions, or some other reason? It was thought that some clue might be had by analyzing for the same period a like number of similar customers who had not been contacted in the Program.

SUMMARY OF KWHR CONSUMPTION OF 80 CUSTOMERS NOT CONTACTED

	1938	1939	Decrease
August	7,996	7,814	182
September	8,874	8,464	410
October	7,614	7,579	35
	24,484	23,857	627

Decrease—2.6 per cent.

In a report covering this survey, the Company said:

"It occurred to us that the two groups might not be comparable. We, therefore, zoned the two groups which are shown in the third tabulation—

CUSTOMERS CLASSIFIED BY ZONES

Zone	Contacted	Not Contacted
Below 10 kwhr	1	1
10- 30 kwhr	9	8
31- 50 kwhr	7	11
51- 70 kwhr	11	9
71- 90 kwhr	13	9
91-110 kwhr	16	12
111-150 kwhr	20	19
151-200 kwhr	3	6
201 kwhr and over	0	5
	80	80

This revealed that we had included five customers whose average consumptions were over 200 kwhr per month in the group of customers who had not been contacted. A close analysis of these accounts showed the five customers combined used a total of 30 kwhr more in the three months' period in 1939, which would have an inverse effect on the comparison rather than adding to the difference."

This analysis is not conclusive by any means but it certainly points toward the success of the Program as a load builder through either the stimulation of appliance sales or the encouragement of greater use of service by way of individual service to customer's appliances and by way of more friendly relations, or perhaps all considerations.

Further measurement of sales value lies in the statements made by dealers and distributors, one manufacturer's representative saying:

"* * * You should be complimented on this program, for I know that it is not only helping your company, but it is helping the manufacturers as well. * * *"

The best sales tool available is a welcome acceptance of a Representative on the part of the customer who will instinctively increase his use of service if he is more familiar with the value of such service. This means of presentation, then, naturally makes an easy entrée. Sales resistance is broken down as soon as the customer knows the Representative is not trying to "peddle" something. Some of the values of the Customer Service Program as a sales aid may be itemized for summary purposes:

Full coverage of all customers is one of the purposes of the Program.

It instills in the customer's mind the value and the cheapness of and the desire for greater use of service by increasing his satisfaction with existing service.

Increases use of existing equipment by, first, creating a closer feeling between customer and Company, and second, convincing customer of

the low cost of extended use of service.

Restores to the line appliances which have fallen in disrepair, through the mechanical efforts of the Representative or by assistance of the service department.

Reduces load mortality by correcting any misunderstanding of operating cost on part of customer.

Provides a growing list of prospects by learning customer's desires, his present use, and his ability to make greater use of service.

Provides for statistical purposes a census or survey of appliance saturation—a market survey, as it were.

"Unsells" competitive service before the customer is approached by the competitor.

Impresses the customer by giving him an authority on the business with whom he may converse.

Its Cost

The cost of the Customer Service Program varies mainly with the type of territory served and the prevailing wage scale.

More interviews can be completed in a day in urban areas than in rural. Experience of several companies shows that of all calls made in a city approximately 50% of the families are away from home and require one or more call-backs; also, that the number of completed interviews will average approximately five a day for each representative. In rural areas, the percentage of call-backs is less, but due to the more friendly nature and slower pace of rural dwellers, the number of completed interviews averages less than five, generally around three a day.

It may be said parenthetically that those who believe that the number of interviews completed in a day can be increased considerably are due for disappointment. It requires an hour's visiting generally for the customer to become well enough acquainted to "let down his hair," so to speak, and talk frankly. If the interview is terminated before this point of relaxation is reached, in the interest of conserving time, the cost of the program may be wasted. The customer should be permitted to carry on the conversation as long as he wishes, within reason, but the Representative should endeavor to keep the subject from straying too far afield. It must be remembered too that we can not antagonize a customer by taking his or her time at lunch hour from eleven thirty o'clock to one thirty or two o'clock or too early or late in the day. The Representative's time in the field is limited.

If a Representative paid from $125 to $155 per month averages five completed interviews a day for 25 days of the month, the cost of the Representative will amount to an average of $1.12 per interview. In urban areas, where from 15 to 20 or more representatives are active, an accounting clerk at $130 and two $110 stenographers take care of the office work and add between 10c and 15c per interview to the cost. Since the cost of satisfying complaints, service calls and requests for sales or home service representatives should be taken care of in the course of general business, no part of this work is charged to the Program. The full cost of transportation and incidentals is allowed. The unit cost per completed interview in the city then becomes $1.25 to $1.50 or roughly $1.40.

In the country territory, the Representatives have time to make out their own customer slips so the Representative's wage and transportation are practically the only additional costs to which the Company is put. However, because of the smaller number of interviews the unit cost in rural areas may reach $1.75 per call. Cost to other companies will vary from these figures according to local values.

Its Value

To many, a cost of from $1.40 to $1.75 per interview sounds exorbitant. To those who have experienced the benefit of the Program, it is cheap and well worth while. In all fairness, these amounts should not be charged to one service such as Public Relations but should be allocated to the particular accomplishments of the Program—service, repairs of customers' appliances, sales, and new business as well as relations.

It has been shown that by satisfying customer complaints on voltage and regulation, or by serving the customer in repairing appliances and placing them on the line, the Company is benefited with increased kwhr sales to the extent of paying for a portion of the Program cost. Likewise, the numerous sales tips, suggestions and requests and the creation of desire in the customer's mind for more electrical living has made it possible for some Companies to feel that the relations aspect of this work has cost nothing.

As an illustration of new business value we might assume that certain companies estimating the annual revenue of an electric range at $25 are willing to spend one year's revenue to obtain a cooking customer. Twenty-five dollars will cover the cost of eighteen personal Representative interviews, and the likelihood of selling or at least instilling in the mind of one customer in eighteen the idea of using electric cookery is fairly good in many areas. Increasing the use of other electric services in similar proportions is also a probability.

There is compensation too by way of increased efficiency in the personnel. It has been definitely shown that after the adoption of the Customer Service Program employees have become more courteous and agreeable, that they work faster and more efficiently due to renewed interest in their jobs, and that complaints, repairs and the like are more expeditiously handled. The morale of the entire organization is lifted as customers complain less, understand more of our problems and policies and become more complimentary of the services performed for them. With a bolstered attitude the employees go about their work in the field and the office with a higher chin and the feeling that the customers do have some respect for them, and will accept them in a friendly manner. Such an *esprit de corps* helps to further the relations Program so the whole matter assumes the shape of a circle spinning its way to greater satisfaction for everyone.

Discussion of value through the channel of the employee brings us again to the human element of our business. The utility industry is a particularly good example of the *human* factor in relation to the *functional* factor of business. Through our daily work we are entirely familiar with the value of the functional factor, but only subconsciously aware that the human factor has any value at all.

From the inception of an idea for establishing a new utility, *human relations* are involved; the promoter has to deal with bankers, the officers with the political bodies and regulatory authorities, the engineers with the manufacturers of equipment, the superintendents with the working man, and the entire organization with the customers and prospective customers. We spend thousands of dollars to maintain our capital structure and thousands more to maintain our service, but what are we willing to spend for the maintenance of our human relations—without which our capital structure and our service will not survive?

As Emerson put it:

"We take care of our health, we lay up money, we make our roof tight and our clothing sufficient, but who provides wisely

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Financial Statements In Connection With Utility Rate Regulation

By H. C. Hasbrouck
The Utility Management Corporation

A LITTLE over two years ago, I was struck by a remark in one of Dorothy Thompson's columns which is worth repeating. The burden of her comment was carried in a phrase which she said had been appreciatively quoted by Justice Brandeis but was originally uttered by Colbert, French Minister of Finance under Louis XIV. The remark attributed to Colbert was: "Accountancy, that is Government."

I am sure that I do not have to elaborate on Colbert's incisive statement or stress further the vital function of accounting and, therefore, of financial statements, the effective media in which the results of the accounting process are embodied, for all governmental procedure, including utility rate regulation. Conceding the fundamental importance of financial statements and of the accounting records on which they are based, I wish rather to call attention to some of the dangers in public utility rate regulation of the misuse of financial statements, of a reliance on them for determinations which are beyond their scope, and, specifically, of the misinterpretation of some features of financial statements prepared under the prevailing uniform systems of accounts established by Federal and State regulatory bodies.

However, before taking up specific instances of such pitfalls, I should like to quote my old friend, Henry M. Brundage, former vice-president of the Consolidated Edison Company, now gone to his reward, on the accountants' responsibility in rate cases. In 1925, in an address before the Accounting Section of the old National Electric Light Association, he said:

"The development of public utility regulation during the past ten or fifteen years has added greatly to the weight of the books of account. The very fact of regulation empowered by law precludes disavowal by the public authorities of the results under that accountability. To the extent that the books, as evidence of fact, have thus assumed larger proportions in the proofs of a rate case, correspondingly added responsibilities are placed upon the accountant. He cannot sit back, however, in quiet complacence until a rate case looms up dark upon the horizon, and then mend his fences for the test. He can never tell when some transaction of today, with apparently nothing but today's problems involved, may in the future become the center of stormy contention in a rate case. His die is cast when the entry is recorded, and the future alone will finally appraise the wisdom of his action. He must build the structure, therefore, to withstand that test, even though he may believe himself immune from such a plight.

"Broadly speaking, rate cases have greatly developed the significance of the accounting records in the activities of public utilities, and have placed a stewardship of great responsibility upon the accountant. They have brought him out of the old time slough of a 'necessary evil' to his place as an expert in the affairs of the Company."

One of the reasons why we find a tendency to rely overmuch on financial statements in public utility rate making is the constant pressure among governmental agencies for a formula, a nice, precise rule which, once having been determined, obviates the necessity for further thinking and can be applied more or less mechanically by the kind of clerical talent with which governmental agencies are always more abundantly supplied than with experts possessing both experience and intelligence. If public utility rates could be satisfactorily fixed by a few clerks supplied with financial statements, computing machines, and a slide rule, there would be an immense simplification of what is actually a complicated and extremely difficult task. The attitude of some regulatory bodies toward utilities' spokesmen who dare to suggest that a clerk with a slide rule is not the best instrument for fixing rates appears to be one of resentment that the utilities should resist the obviously desirable simplification of the regulatory process. The desire to codify and formalize, while useful enough within proper limits, often leads to a multiplicity of rules and regulations, to useless and costly refinements of accounting procedure, and to rigid and dogmatic interpretation of financial statements. I am reminded of a remark of one of the members of the New York Public Service Commission, Second District, when I was on the staff of that body, and the commission was urged at a hearing to adopt depreciation accounting rules that if literally enforced would have had the effect of setting up and maintaining separate reserves for every item of depreciable plant—"Why, that is accounting gone mad!"

The income account is, of course, the financial statement which is the first object of study in any effort to determine whether the rates charged by a public utility should be modified. Unfortunately, the approach to the problem from this direction too often, usually, in fact, gets off to a bad start. The eagerness for a formula over-simplifies the case. What does the income statement show as Utility Operating Income? What ratio does this bear to the "rate base"? If it is more than 6 per cent, clearly, rates should be reduced until the income produced by them is no more than 6 per cent or whatever other ratio is assumed, generally upon little or no sound economic grounds, as a "fair" rate of return. But a correct decision is not so simple as that.

In the first place, I am sorry that the phrase "fair rate of return" ever got into the law and practice of public utility rate making. To most people, the word "fair" carries a moral or ethical connotation. To charge rates that give more than a "fair" return seems to the average citizen definitely anti-social. Of course to accept utility service at rates which give owners of utility property less than a "fair" return is logically just as immoral, but the average citizen's logic never carries that far. Actually, there should be no question of ethics in public utility rate regulation. It is an economic problem and should be decided on economic grounds. A "fair" return is the amount of income which will be just sufficient to attract the necessary new capital into the enterprise, and that should be the first question to be determined in any rate case. Usually, however, it is passed over lightly or assumed on the basis of a few court decisions or

on the opinion of commissioners who, whatever their other qualifications, are seldom equipped either with practical business experience or a background of sound training in economic principles. No financial statement or ex-cathedra pronouncements by commissions or courts can of themselves determine what is the rate of return on invested capital which will keep a utility enterprise alive.

Second, the latest available 12 months' income statement as the sole test period for determining what should be a reasonable income for an indefinite future is too short. It emphasizes formula rather than judgment. Before I left the service of the New York Commission, I urged that wherever practicable at least 10 years' earnings and expenses should be considered in every rate case. Broad trends, rather than the experience of a relatively short test period, are the sound economic basis for determining the reasonable limits of public utility income.

Next, in reading the income statement as an index of reasonable earnings and, therefore, of reasonable rates (the two are not synonymous but too frequently are so thought of), too much weight is given to the form of the statement as opposed to its content. Again, the wishful dependence on formula. I have in mind particularly the importance which has come to be attached in public utility rate determinations to the distinction between charges "above the line" and "below the line," as current terminology has it. For the benefit of those who may not be familiar with the colloquialisms of utility rate regulation, I should explain that in the now more or less standardized form of income statement required of public utilities by regulatory authority the "line" is the separation between those charges and credits the net result of which is presumably the net income available to pay a return on utility invested capital in any form—interest, rent or dividends—and the charges and credits which indicate the disposition of that income or record accretions to and deductions from income not arising from utility service.

While such a division is certainly desirable for the income statement of a regulated utility, it is only too easy to assume that it is a clear cut, readily determined distinction, whereas it sometimes happens that items required to be shown as deductions "below the line" are legitimate costs of rendering utility service; and, conversely, some charges to operating expense accounts represent in the final analysis a form of return on invested capital. The income statement itself, unless set forth in minute detail, cannot bring this out. Consequently, such a statement should not be used alone as an indication of the amount available for return on invested capital.

A good illustration is the requirement in the codes of account recently promulgated by the New York Public Service Commission that income taxes should be shown "below the line," i.e., as though they were a distribution of net income to investors. The argument for this accounting treatment was first, that income taxes are computed on the entire taxable net income of an enterprise, not separately on the income from electric, gas, other utility, non-utility operations, and non-operating investments respectively; and, second, that the income tax is levied on net income otherwise available for distribution to investors and, therefore, that the total allowable net income to give a "fair" rate of return should first be determined, then, if necessary, the "fair" rate of return should be increased to compensate for the loss in taxes. Theoretically, it is, of course, quite possible to arrive at a sound economic solution of the rate problem in this way. The investor who will be satisfied with a 5 per cent return does not care whether the same amount is called a 5 per cent return after income taxes or a 6 per cent return before income taxes. But since taxes have been consistently reckoned as necessary costs of rendering service, i.e., among the costs which belong "above the line," their inclusion among the deductions "below the line" tends to create a false impression of the utility income available for return, even though the regulatory body gives them proper weight in the ultimate determination of a "fair" return.

This convention of charges above and below the "line" is responsible for some confused thinking. It is frequently stated that all charges "above the line" are charges which the utility customer pays for. Actually, rates bear no such simple and direct relation to operating costs. A utility cannot collect in rates from its customers anything it chooses to call an expense, and could not do so even if there were no regulatory authority constantly on watch to see that expenses are reasonable. The utility can collect only what the service is worth to the customer, not what the utility considers its cost.

It should not be assumed in reading a utility income statement that all charges below the line are distributions of income to which the investor is entitled; and it should likewise not be assumed that charges above the line are "collected" from the customer in the rates. Nevertheless, utility income statements are often so misinterpreted.

There is evidence in the recently adopted and prescribed codes of account for regulated utilities—specifically in the codes of the Federal Power Commission and National Association of Railroad and Utilities Commissioners, which many state commissions have adopted with slight modifications—of a tendency toward what experienced public utility operators and accountants consider a naive belief that uniform cost accounting will produce expense statements that in themselves will go a long way toward solving the problems of rate regulation. Now, I am probably rash in admitting a considerable skepticism about some of the results attributed to cost accounting. The basis for that skepticism is the feeling that accounting which relies largely on personal judgment in apportioning costs not in their nature clearly and directly assignable to definite categories must be used with great caution which, in practice, is frequently conspicuous by its absence. I hasten to add that I am in no position to elaborate this thesis with respect to industrial cost accounting; but I think I am on firm ground and know that most of my utility accounting colleagues will support me when I say that detailed cost accounting for utilities is only too often a delusion and a snare and that operating statements based thereon must not be accepted too literally.

As an illustration, may I offer the importance attached in the new accounting codes to the distinction between transmission costs and distribution costs, particularly of electric plants. There is a delusive appearance of precision in the use of the terms "transmission" and "distribution," and the utilities have often been taken to task for not setting up their books and statements in such a way that the costs attributable respectively to the two functions are definitely shown on a basis that makes for significant comparisons between different utilities. I have had occasion to study very carefully and discuss with my associates just what the definitions of "transmission" and "distribution" say in the new accounting codes. The conclusion we all arrived at, after what in the aggregate was probably several days of such study and dis-

cussion, was that, according to the official definitions, transmission costs attach to the construction, operation, and maintenance of property used in conveying electric energy from the generating or receiving point to a distribution center; and that a distribution center means the place where property used in conveying electric energy ceases to be transmission property and becomes distribution property. That is to say, neither word is defined except in terms of the other. Nevertheless, these definitions in the official codes govern the preparation of operating statements, which in turn are intended to be used in fixing utility rates. It is no wonder, therefore, that although the Federal Power Commission's Uniform System of Accounts uses language such as is paraphrased above, which implies a significant distinction between transmission and distribution costs, the Federal Power Commission itself in a recent decision (No. 34, Kansas Gas and Electric Company) said:

"The Commission is of the opinion that in the broad grant of authority applying the provisions of Part II of the Act to the 'transmission of electric energy in interstate commerce' Congress intended to cover all cases where electric energy is conveyed across state lines whether the conveyance be by so-called transmission facilities or by distribution facilities. There is nothing in the Act or in its legislative history to indicate that Congress intended to draw any nice distinction between transmission and distribution as related to the conveyance of energy across state lines. *Indeed, the extensive expert testimony introduced in this case by both the applicant and the Commission serves only to demonstrate that no clear-cut differentiation between these terms is recognized either in the industry generally or even among technical experts themselves.*" (Emphasis supplied.)

Financial statements which purport to show operating costs for particular classes of public utility service are not necessarily useless, but are subject to grave misuse.

Coming now to the balance sheet, we have a form of financial statement which for public utilities has a factitious importance because of the legal basis for public utility rate making. Its pitfalls are nearly all related in some way to a confusion of thought which all must have met, the confusion of the concepts of "cost" and "value."

It is very easy, even for the clearest-headed accountant to become illogical at times in his thinking about these two related but distinct ideas. "Cost" frequently or generally is synonymous with "value," at least with value in exchange, at the time cost is incurred and recorded in the books of account. From that time on, however, "cost" for a particular item of property is a fixed, definite, historical fact, while "value" of the same item may fluctuate from zero to infinity. The accountant knows, although he sometimes forgets, that the figures on his balance sheet which represent assets stand primarily for costs, not values, of such assets. The average layman, however, thinks, none too clearly, that a balance sheet purports to set forth the value of assets as at the date it is stated. That is a job for an appraiser, not an accountant; but too many persons do not realize the fact.

Now consider some of the complications that this confused thinking brings about in the use of the balance sheet for public utility rate making. The fundamental rule of law in determining the reasonableness of public utility rates has been, ever since Smyth vs. Ames, that the rates must be such as give the investor "a fair return on the fair value" of his property. I have already expressed my dislike for the word "fair" in this formula because of its ethical connotations. Let me now say that I also dislike the word "value"—and thus, it may appear, go completely over into the camp of the "prudent investment" theorists, who now are expecting that the Supreme Court will soon upset Smyth vs. Ames and, as a consequence, upset the entire financial and rate structure of the public utility industries.

However, perhaps I am not quite such a traitor to the utility cause as might at first sight be inferred from my objection to the use of the word "value" in a rule for determining reasonable rates. I dislike "value" because it is a slippery word, a treacherous word, a word that, like St. Paul, but without his excellent reason, is all things to all men. Economists can use it correctly (though even they don't always do so) because they are trained to recognize all its nice shades of meaning and its implications in various contexts. Accountants and lawyers do well to be careful in dealing with "value" and to define precisely every time they use it the sense in which it is used. If the Supreme Court in Smyth vs. Ames had kept away from the word "value" and stated that rates should be fixed to provide as closely as possible the return which would currently satisfy the owners of other invested capital upon the reasonable (or, if you like, prudent) amount of the investment in the enterprise whose rates were under review, *such amount to be stated in terms of the prevailing price level*, it is my belief that a very large part of the troubles of the public utilities would never have arisen.

However, Smyth vs. Ames and its historic dictum still stand, and far too many persons look at utility balance sheets and assume that the Plant Account is supposed to represent the "value" of the utility's fixed assets and, therefore, is the predominant element in the "rate base" for determining a fair return. When it becomes evident that cost of plant is not the same as value of plant and that the Plant Account is usually an illogical composite of costs and values, the cry goes up to reform utility accounting, and insist on consistent recording of costs which, just because they are, when once determined and recorded, fixed and definite will, of course, be a simple, accurate rate base. The argument is strongly urged that an easy formula for rate making is *ipso facto* an economically sound formula. That is not logical; it is wishful thinking.

From such thinking, however, arises the doctrine embodied in the newer uniform systems of accounts for public utilities, which attaches vast significance to the concept of "original cost." "Original cost," as most by this time are probably aware, is defined in these accounting codes as the cost of permanent property to the first owner who devotes it to the public service; although the practical accountant finds it hard to conceive any reason why the cost of property to an owner who may have acquired or constructed it a generation or more ago is of any great significance, either accounting or economic, to the present owner, who may have acquired the property after it has passed through a dozen successive ownerships, and who certainly never has for a moment thought that he had any interest in what the first owner paid for it. Nevertheless, the duty is now imposed on all public utilities subject to the requirements of these new accounting codes to ascertain, and if they cannot do so, to guess what the owner of the property when it was first used in public service paid for it. Utilities have already spent millions of dollars in the effort to comply with directions to ascertain as nearly as possible the "original cost" of their property, and will spend millions more. The United States Supreme Court, in the famous case of the American Telephone & Telegraph Company, et al, vs. the United States, the Federal Communications Commission, and the National Association of Railroad and Utilities Commissioners, decided December, 1936, held that the

demand of a regulatory body that "original cost" be determined and separately stated on the utility balance sheet was not in itself a violation of the constitutional rights of the owners of utility property. A careful reading of the opinion of the court indicates to me that it found it difficult to reach such a decision and rather strained its reasoning to uphold administrative authority, because the principal ground upon which the Court found the requirements of the Federal Communications Commission system of accounts not to be so arbitrary and capricious as to be unconstitutional was that, since many transfers of utility property took place where the parties were only technically separate (such as between two corporations under common ownership or control) and the price at which such transfers were made could not be evidence of value in exchange, which requires free bargaining between a willing buyer and an equally willing but entirely distinct seller, then the "original cost" of the property might have some probative weight in determining its actual value at the time of acquisition by the present owner. On the strength of this decision, utility balance sheets will eventually be issued in which the "original cost" of existing property (which in most cases will be some sort of compromise figure arrived at after more or less squabbling with regulatory authorities) will be shown in one account, and the difference between such figure and the true cost (as accountants use the term) of the same property to its present owner will be shown in a separate "Acquisition Adjustment" account.

What will such a balance sheet mean to the person accustomed to conventional accounting? Too often merely that the "original cost" is the true cost to the accounting utility and that the "Acquisition Adjustment" balance is merely "water." Although unrealized increases in value ("write-ups") will presumably have been eliminated, and the sum of the original cost and the acquisition adjustment accounts will be what the accountant knows as the actual cost of the property, such a balance sheet will be used in utility rate making—such balance sheets have been and are already being so used—to support a contention that public utility investors must be satisfied with a return not on their investment in terms of the number of dollars which historically they put into the enterprise, far less in terms of the number of dollars in equivalent purchasing power, but on the number of dollars which former owners are supposed to have invested. Of course, utility investors will not be satisfied with any such return — unless what at the moment seems inconceivable should take place, a long continued downward trend of the price level, in which case regulatory authorities will discover that the "original cost" rate base is unfair to the customer, as Bryan argued for the People in Smyth vs. Ames, and the utilities and commissions will then change sides once more and the game will begin all over again. When the trend of prices is upward, however, investors will not long put money into utility enterprises if they find that the amount of their investment is measured primarily by the investment of the earliest owner of the property. Instead, they will invest in enterprises where they can expect a return in dollars of equivalent purchasing power to those which they invest, and the utilities will have to depend on government funds for the expansion and maintenance of their service. Perhaps that is what the advocates of "original cost" as the most important element in utility rate making in their heart of hearts desire.

There may be, as the Supreme Court with some difficulty found, an element of justification for attaching importance to "original cost" as a check on transfers of property at more or less arbitrary values. There is more justification for separately recording the excess of the price paid for property over the price which the physical plant in its condition at the time of acquisition would have brought. This price is normally equivalent to the cost to reproduce plant new, less its actual—not "accrued" or theoretical—depreciation. The excess of such cost to the purchaser over the physical value at the time of purchase is the price paid—whether "prudently" or not may for the moment be disregarded —for intangible values which may have been very real or may have represented only the capitalization of never to be realized hopes. The separate recording of the cost of such intangibles as distinguished from the cost of physical property was required in some of the earliest codes of account for related utilities—those of the New York Public Service Commissions issued in 1908. To my mind, a balance sheet showing separately the price paid by the accounting utility for intangible values and the price paid at current price levels for physical property would be a much more useful financial statement for public utility rate making than the one which places distorted and misleading emphasis on "original cost." Some utilities are already analyzing their "Acquisition Adjustment" accounts to show on the evidence of appraisals at the date of acquisition how much of the price they paid for acquired properties represents true cost of tangible assets and how much represents the cost of intangible values. The former they will insist on writing off gradually through operating expenses as depreciation or amortization charges; the latter may or may not be claimed as property amortized through expense rather than through income or surplus charges, depending on the evidence that can be offered of the reality of the intangible values for which the purchase price was paid. At least one state regulatory commission has accepted this procedure as proper and reasonable accounting, and the financial statements of utilities under its jurisdiction may be made accordingly and used for what they are worth in fixing rates.

I have left to the last any mention of what is undoubtedly the most controversial item in utility financial statements and their use in connection with rate regulation. This, of course, is accounting for depreciation which, in a very significant sense, is not accounting for depreciation at all. The explanation of the paradoxical statement lies in our old difficulty, the failure to distinguish carefully between the concepts of "cost" and "value."

What accountants really mean when they talk about "conservative" depreciation policies, although some of them probably do not realize it themselves, is an amortization or apportionment of the *cost* of depreciable property through charges to an indefinite sequence of accounting periods to the end that each period shall bear an "equitable" share of the cost of long-lived assets. There is no mathematically precise meaning attached to the word "equitable." It has to be felt rather than defined, and the determination of what is "equitable" in any given set of circumstances is a function of informed judgment and imagination rather than of pure reason. However, a combination of informed judgment and imagination is not one of the commoner qualities of the human mind, and too frequently reliance is on dogma or formula rather than on judgment and imagination in determining equitable depreciation charges.

The word "depreciation" has the root meaning of loss in value. If "cost"

means "value" as often seems to be positively assumed amortization of cost is equivalent to recording loss in value. But cost, as you all know, is not value, therefore, the amortization of cost through equitable charges to depreciation expense accounts is not the same as recognizing actual losses in value. Consequently, the accrued depreciation or depreciation reserve need not at any given time represent the amount of value lost by depreciable property since the date of its construction or acquisition by the accounting utility. To determine the amount of value lost—or gained—between any two dates we need to know not the cost but the value of the property at each of the two dates, giving due weight to all factors whether of appreciation or depreciation. Such a determination, of course, is not a function of accounting procedure but of the appraisal engineer. It is desirable, however, for the accountant to arrive at some method which will reflect in the operating statements which he prepares the proportion of the *cost* of depreciable property which the expenses for the period covered by such a statement should equitably bear.

A careful reading of the recent codes of accounts for public utilities, those of the Federal Power Commission and the National Association of Railroad and Utilities Commissioners more specifically, shows that they do not provide for the recognition of lost value in the expense statements. They do say that each period shall be charged with its proportionate share of lost "service" value. But "service" value is defined only in terms of cost, i.e., as the difference between "original cost" and estimated future net salvage value of depreciable plant. The definitions are not free from ambiguity, but no one has seriously contended that they do not imply amortization of cost as distinguished from the recording of unrealized losses in value. This is clearly admitted in the 1939 report of the Special Committee on Depreciation of the National Association of Railroad and Utilities Commissioners, in the membership of which committee were representatives of the accounting and engineering staffs of the Federal Power Commission, the Securities and Exchange Commission, the Federal Communications Commission, as well as a number of state regulatory commissions. I quote from this report:

"Depreciation in the accounting sense has to do with the recording of costs and is not synonymous with losses in fair value. *Value* may differ from *cost*. Strictly speaking, the term 'depreciation in value' should not be used in utility property accounting. In arriving at fair value, depreciation of property on whatever basis its cost is stated may be considered, together with other relevant factors. Such depreciation estimates, however, are not depreciation of value. Rather, they are merely some of the steps necessary to a determination of value.

"Depreciation from functional causes does not occur with regularity as to time nor with uniformity as to extent. Depreciation from these causes may occur suddenly or may be long deferred or even avoided altogether. The primary characteristic of functional causes of depreciation—from the appraiser's viewpoint—is its unpredictability. In certain instances, knowledge is had of the near approach of some significant change in the art a few years before it happens. In such cases, the appraiser has a basis for estimating accrued depreciation from such a cause. *In the absence of such a knowledge or until a functional cause actually appears there is no accrued depreciation from such a cause* and it is a delusion to attempt to estimate it." (Emphasis supplied.)

* * * "The accumulations in the reserve to provide for retirements due to the irregular causes of depreciation represent advance provision until such time as these causes actually take effect. To that extent they do not represent accrued depreciation."

The distinction between cost and value, then, is fundamental for the proper use of utility financial statements and rate regulation, and especially so in any conclusions which may be drawn from such statements regarding the accounting for depreciation. It is encouraging that, as evidenced by the foregoing quotations, regulatory authorities are becoming aware of this fact and, it may be hoped, will be less likely to confuse the issue in rate cases.

I cannot leave this subject without saying a few words about the almost universal assumption that there is fundamental opposition between "retirement accounting" and "depreciation accounting." As one who probably had as much as any individual to do with the introduction of the phrase "retirement expense," and "retirement reserve," in substitution for the then more conventional "depreciation expense" and "depreciation reserve" in the 1920 Uniform Systems of Accounts for Electric and Gas Utilities promulgated by the National Asssociation of Railroad and Utilities Commissioners, I can say positively that the members of the 1920 Committee on Statistics and Accounts of Public Utilities of that association who approved those accounting classifications thought of this wording as a clarifying change in nomenclature rather than a revolutionary change in accounting principles or methods. We disliked the connotation in the word "depreciation" that linked it with lost value rather than with amortization of cost, which, like our successor committee of 1939, as evidenced in the above quoted excerpts from its report, we felt to be the true accounting approach to the problem; and we hit upon "retirement loss," "retirement expense," and "retirement reserve" as the best words we could find to carry the meaning which we wanted to convey without carrying other meanings by implication. I still think that the words we used were better and clearer than those used in the National Association of Railroad and Utilities Commissioners' codes of 1936, which, upon careful analysis, mean substantially the same thing, but which appear to mean something else. However, I am ready to admit, although in the light of our knowledge at the time it may have been inevitable, that the definition of retirement expense did not sufficiently emphasize the importance of apportioning retirement losses (which we defined essentially as the new codes define "service value," i.e., as the excess of cost over anticipated salvage value) equitably over a sequence of accounting periods. We meant just that, but could not agree on any express limitations within which the equitable apportionment of cost should fall. The newer codes emphasize service life, which is all right, if anyone knows how to determine it; but the fact is, now as then, that for public utility property, 75 per cent of which is retired not because it is worn out but because it has become obsolete or inadequate, there is no method of determining or estimating future service life except within wide margins of error; and the attempted application of actuarial rules to public utility property merely gives a misleading appearance of mathematical accuracy to a decision which must still depend primarily on informed judgment as to the future rather than on detailed analysis of past experience.

"Retirement accounting," therefore, as expressed in the 1920 N.A.R.U.C. codes, is distinguished from "depreciation accounting" as expressed in the 1936 N.A.R.U.C. codes not by any fundamental difference in aim but by a shift in emphasis. Both propose to distribute over a sequence of accounting periods the ultimate retirement loss or realized depreciation as measured by cost less anticipated salvage. Neither specifically insists on the "straight line" method of distributing such loss, i.e., by equal annual charges over estimated service life, as nearly as that may be determined. But the instructions in the 1920 code left

a wider latitude for postponing the amortization charge until the causes of retirement are more clearly foreseen; and most electric and gas utilities, wisely or not, did adopt this policy of postponement, purposely limiting their charges to the amount judged to be barely sufficient to create a reserve that would absorb realized depreciation losses foreseen for a few years ahead. The instructions in the 1936 code, however, imply, although they do not so state in terms, that some estimate of service life must be made in order to determine the "estimated amount of depreciation accrued" during a given accounting period. Since depreciation as used in this classification admittedly does not mean "lost value," and is defined in the 1936 codes substantially as "retirement loss" is defined in the 1920 codes, the only difference between "retirement" accounting and "depreciation" accounting is the assumption by the latter that service life can be determined with fair accuracy, and that the annual charge should bear a definite relation to such estimate of service life.

In practice, because the great majority of utility accountants refused to project estimates of service life far into the future, "retirement" accounting has come to be identified with relatively small charges for amortization of plant costs and correspondingly small reserves; while conversely, "depreciation" accounting probably means to most people nothing more than relatively high charges and reserves. There is no reason, however, in the language of the N.A.R.U.C. 1920 definitions and instructions relating to retirement accounting, why charges and reserves cannot be proportionately as high as depreciation charges and reserves, although there is less pressure in the older code to estimate service life and relate the accounting thereto.

Finally, just a few words about some prevailing misconceptions regarding the significance for rate making of the depreciation reserve on the utility balance sheet. These misconceptions, like so many others, have their source in the confusion between "cost" and "value." If the Plant Account represents value new of the permanent property, and the depreciation reserve represents the proportion of this value estimated to be lost, Plant Account less depreciation reserve and plus working capital would, under existing law, be the rate base; but Plant Account does not purport to represent value new of plant and property, depreciation reserve does not measure lost value, and the utility balance sheet will, therefore, not supply a *prima facie* rate base.

However, such a statement does not imply, as utility accountants and financial managements have been accused of contending, that they desire to eat their cake and have it too, to count the dollar charged off as amortization of cost both as operating cost and as part of the cost of the property in service at the date of the balance sheet. In a sense, of course, the dollars are both, i.e., the Plant Account should record the cost of existing property as yet unretired, while the depreciation reserve should show the amount by which retirement has been anticipated. Nevertheless, to the extent that cost of permanent property is an element in determining reasonable earnings, the utilities are willing to admit that amortized cost, cost less depreciation reserve, may also be an element in such determination. What they cannot admit is that the amount of a theoretically amortized cost or depreciation reserve should replace the one shown on the balance sheet in determining reasonable rates, even though the existing reserve has been created in good faith in accordance with widely held principles of accounting and often under express or tacit approval of regulatory authority. Such a retroactive adjustment of the balance sheet when it has the effect of preventing the free flow of new capital into the enterprise, must and will be resisted by the utility industry.

Refrigerator Sales Exceed Total for 1939

PROMOTIONAL and sales efforts of electrical manufacturers, dealers, utility companies and the Modern Kitchen Bureau, have produced almost phenomenal results so far this year in sales of electric refrigerators and ranges.

Sales of domestic electric refrigerators in July reached a total of 248,538 units, an all-time high record for the month, topping the July, 1939, sales by 51.35 per cent and those of July, 1938, by 179.97 per cent. For the first seven months of 1940 the total sales were 2,116,749, more than for the entire 12 months of 1939 and more than for any previous complete calendar year except the peak year of 1937. The increase over the first seven months of 1939 was 34.10 per cent.

Electric range sales in July were 31,958 units, an increase of 53.71 per cent over July of last year and of 38.95 per cent over July, 1938. For the seven months ended July 31, 1940, range sales were 278,681, a gain of 35.78 per cent over the like period in 1939.

Refrigerator and range sales for the years 1938, 1939 and 1940 are shown by months in the following tables.

DOMESTIC ELECTRIC REFRIGERATOR SALES

	1940	1939	1938
January	234,662	161,071	104,984
February	280,980	198,528	145,094
March	298,238	251,644	174,332
April	339,693	260,204	212,884
May	385,688	273,966	179,189
June	328,950	268,848	104,796
July	248,538*	164,211	88,772
Totals—7 months	2,116,749**	1,578,472	1,010,051
August		94,734	92,956
September		73,149	62,148
October		62,055	34,345
November		55,113	32,103
December		92,479	47,599
Year		1,956,002	1,279,202

*Increase over 1939, 51.35%; over 1938, 179.97%.
**Increase over 1939, 34.10%; over 1938, 109.57%.

ELECTRIC RANGE SALES

	1940	1939	1938
January	39,496	30,363	21,000
February	35,579	29,288	25,000
March	42,207	32,485	30,000
April	46,829	28,036	29,000
May	46,518	34,722	27,000
June	36,094	29,553	25,000
July	31,958*	20,791	23,000
Totals—7 months	278,681**	205,238	180,000
August		26,441	21,000
September		28,437	20,000
October		25,577	19,000
November		20,607	15,000
December		14,453	15,000
Year		320,753	270,000

*Increase over 1939, 53.71%; over 1938, 38.95%.
**Increase over 1939, 35.78%; over 1938, 54.82%.

McGraw Prize Paper

A New Method for Determining Relay Selectivity and Coordination

By Charles L. Betts, Jr.

AUTHOR'S NOTE: This paper has been written primarily for the relay engineer engaged in the problem of determining relay settings that will provide fault discrimination. To the relay engineer this is termed "selectivity"; it may be defined as the ability of the relay on the faulted equipment to set its protective apparatus in operation before any other relay has had time to function.

The rack method does not entirely eliminate relay curves as it is merely a device for comparing two or more relay curves at the same time. Perhaps no one but the relay engineer himself realizes the tedious and monotonous task involved in plotting and replotting a series of relay curves to investigate the selectivity for all fault conditions. With the rack, however, only one relay curve is plotted for each relay. From this one curve, one "current scale" is constructed for each relay which can be used as frequently as desired in the rack.

The author wishes to express his appreciation for the valuable assistance and cooperation offered by Mr. Albert Alberi in the solution of many problems in connection with relay selectivity, and for his kindness in reading the text.—C. L. B.

THE PURPOSE of this paper is to describe a new method for determining the selectivity and coordination of relay settings used for protection on an interconnected power system. But before taking up the new method, it would be well to review briefly the present method. In order to simplify this discussion, only one type of relay will be dealt with; namely, the inverse-time induction type most commonly used in connection with overcurrent and reverse power or directional protection.

Plotting Relay Curves

The inverse-time relay is designed to operate at various intervals of time depending on the magnitude of current which passes through its windings. Thus, at low current values it will take the relay a longer period of time to close its contacts than at high current values. This inverse-time characteristic is shown by a curve, or series of curves, plotted with time in seconds to close contacts as the ordinate against per cent pick-up current as the abscissa.

These curves, plotted on ordinary rectangular coordinate graph paper, are hyperbolic in shape and are parallel to each other, depending on the lever setting. The lever setting of the relay does not alter the shape of the curve, just its relation with respect to the other curves, as it is merely an adjustment for the contact separation desired.

MR. BETTS

Mr. Betts is the winner of the Second James H. McGraw Prize for 1940.

He graduated from Rensselaer Polytechnic Institute as Mechanical Engineer in 1933 and also attended Rider Business College, Trenton, N. J., during the year 1934. He was employed by M. R. Scharff, New York City, in connection with the inventory and appraisal of Westchester Lighting Company's properties from 1934 to 1935. On the completion of this work he was transferred to the Company's Continuing Property Record Department. Since 1937 he has been employed in the Electric Test Department of the Company.

In 1936 Mr. Betts won the Second H. M. Byllesby Prize, awarded through the Edison Electric Institute.

The manufacturer usually furnishes a set of curves for the relay, each curve corresponding to a definite lever setting or position; refer to Fig. 1. Intermediate curves can be determined by interpolation, the minimum or fastest setting being determined by the minimum contact separation advisable for safe operation; that is, with the lever set to the zero position the contacts are closed, and with the lever set to the highest position, the contact separation is a maximum and hence the time delay is a maximum.

These curves, as submitted by the manufacturer, are rather awkward to handle with respect to setting relays to obtain adequate selectivity. It has been the practice in the past, therefore, to replot these curves to a larger scale, and at the same time to change the ordinate scale from "Seconds to Close Contacts" to "Cycles to Close Contacts." It is possible, from these enlarged curves, to interpolate accurately for time-current values for intermediate time-lever positions by means of proportional dividers.

The currents thus shown, however, represent the actual currents flowing through the relay coils, or rather the number of times pick-up current. In order to make these curves of more practical value in connection with actual fault currents on the various feeders and transformer banks, it is necessary to multiply the pick-up current by the current transformer ratio, and then multiply this product by the number of times pick-up current obtained. The resulting curve will have primary current as the abscissa and cycles to close contact as the ordinate. Thus after a curve has been drawn for a particular setting, it is possible to determine the cycles to close contacts (or tripping time) for all values of primary current.

One further modification, when plotting relay curves, is the use of logarithmic cross-section paper. The reason for using logarithmic paper is that it extends the curve for low current values and makes the lower end of the curve more legible.

Determination of Selectivity by Means of Relay Curves

A set of relay curves is drawn up for each substation. By a "set of curves" is

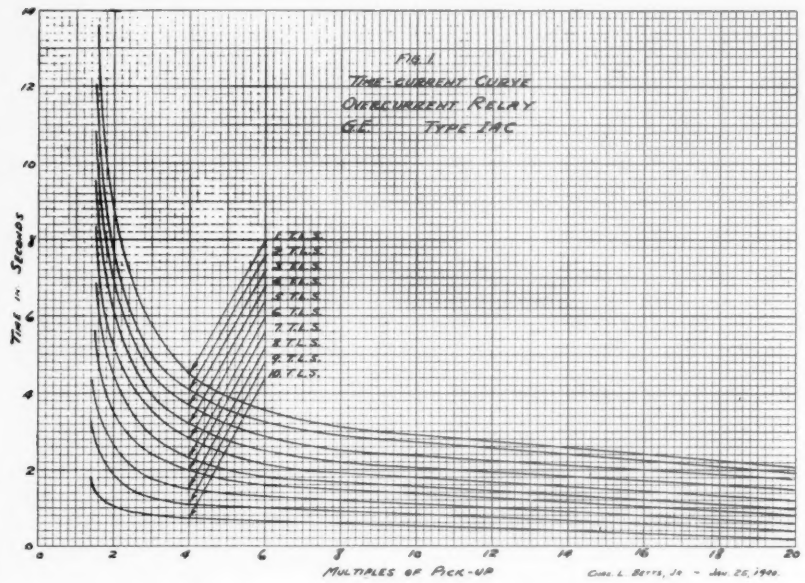

Fig. 1—Time-current Curve Overcurrent Relay, Type IAC

meant a separate curve for each relay setting, which will include the relays on all the feeders and transformer banks at the substation. It is wise to draw these curves based on the primary voltage with which the relay is associated, and then to multiply or divide the current by the power transformer bank ratio, as the case may be, when comparing relay curves which are based upon different voltages.

When comparing relay curves in order to determine the selectivity between relay settings at different substations, it is customary to draw the relay curves involved on a single graph. Then, by plotting the currents which flow over each feeder for a fault, it is possible to compare the tripping time of each relay and to determine the clearance between tripping times.

This is rather a tedious procedure inasmuch as it involves redrawing the same relay curves in order to determine selectivity between relay settings for faults on other feeders. When one particular relay setting has to be changed, it necessitates changing the curve on each graph where this curve is involved. The following problem in relay selectivity will be explained in detail in order to better describe the method referred to above.

The results of tests conducted on the d-c calculating board for a fault on the 13 kv Bus No. 2 at Eastchester substation indicate a current distribution as shown in Fig. 2. This fault is fed by current over Fdr. 9572 from Dunwoodie, by current over Fdr. 9903 from both Dunwoodie and Anaconda, and by backfeed current over Bank No. 3 at Eastchester. There are directional relays on Fdrs. 9572 and 9903 at Eastchester, overcurrent relays on Fdrs. 9572 and 9903 at Dunwoodie, directional relays on the 4 kv side of Bank No. 3 at Eastchester, and directional relays on Fdr. 9903 at Anaconda.

The fault will be considered as a three-phase fault on Fdr. 9572 near the Eastchester 13 kv Bus No. 2. For this condition the directional relays on Fdr. 9572 at Eastchester must be selective with the directional relays on the 4 kv side of Bank No. 3 at Eastchester, with the overcurrent relays on Fdr. 9903 at Dunwoodie, and with the directional relays on Fdr. 9903 at Anaconda. Accordingly relay curves for the relays involved are plotted on a common graph, all to the same base, which in this case will be 13 kv. This common graph is shown in Fig. 3.

It is obvious that under this condition the fault current on Fdr. 9572 at Eastchester will be the summation of the currents over Fdr. 9903 and Bank No. 3, or in other words, 5904 amp plus 1200 amp, which equals 7104 amp. Now of the 5904 amp flowing over Fdr. 9903 at Eastchester, 4924 amp are supplied by the Dunwoodie bus and 980 amp by the Anaconda bus. The next step is to indicate the current value over each feeder or bank on its proper relay curve. (See Fig. 3.)

From this it is seen that the overcurrent relay on Fdr. 9903 at Dunwoodie will close its contacts in 57 cycles when 4924 amp flow in the feeder, the directional relay on Fdr. 9903 at Anaconda will close its contacts in 45 cycles when 980 amp flow in the feeder, and the directional relay on the 4 kv side of Bank No. 3 at Eastchester will close its contacts in 58 cycles when 1200 amp flow over Bank No. 3. Of the three given above, it is apparent that the directional relay on Fdr. 9903 at Anaconda will trip in 45 cycles, or it is faster than

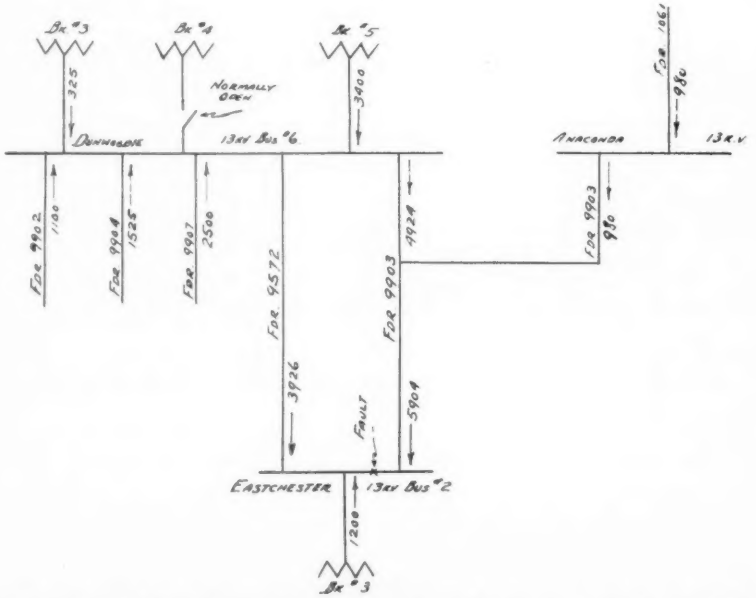

Fig. 2—Current Distribution for a Three-phase Fault on 13 kv Bus No. 2 at Eastchester, shown diagrammatically

the relays on the Dunwoodie end of Fdr. 9903 or Bank No. 3 at Eastchester.

A fault on Fdr. 9572 near the Eastchester bus should be cleared before any other feeder trips. As there must be from 25 to 30 cycles clearance between the tripping time of the directional relay on Fdr. 9572 at Eastchester and the directional relay on Fdr. 9903 at Anaconda, and as the fault current on Fdr. 9572 is 7104 amp, the setting on this relay must be 45 minus 28 or 17 cycles (or less) at this current value. A relay curve is selected that will pass through this point (7104 amp at 17 cycles). Fdr. 9572 has a current rating of 300 amp, so a pick-up is selected about 1½ times above this, or say 420 amp. It is customary to express the setting time at 5 times pick-up current, which in this case would be 5 × 420 equals 2100 amp. Thus the setting determined for Fdr. 9572 at Eastchester will be expressed as 420 — 2100 — 24; meaning that the relay will pick-up at 420 amp and trip at 2100 amp in 24 cycles, and when the current reaches 7104 amp it will trip in 17 cycles.

Determination of Selectivity by the Rack Method

The rack method for determining selectivity consists chiefly of a device which obviates the redrawing of relay curves. The original curve for each relay setting must be drawn, as in the past, but in addition the current values are projected to the right hand margin, as shown in Fig. 4. The slope of the curve will determine the spacing of the currents when projected, and as all the curves are drawn to the same scale of coordinates, it is possible to compare these projected current values with one "cycles" scale.

Instead of projecting the current values to the right hand margin of the graph on which the relay curve is plotted, however, it is possible to project these currents to a strip of paper ½ inch in width; these strips are called "current scales." In drawing up these scales, the bottom edge of the strip must be on the same line as the zero of the cycles scale. The heading at the top of each current scale should give the feeder or transformer number, the type of protection (overcurrent or directional), the relay setting expressed in values of primary current and cycles, the type, make and size of relay, and finally the current transformer ratio.

The cycles scale and the current scales for several different feeders are used in the following manner. A rack or board is constructed with a cycles scale on the left hand edge, and to the right slots or spaces are provided for inserting several current scales. The bottom edge of each current scale must be on the same horizontal line as the zero of the cycles scale. The current scale for the relay on the faulted feeder is placed in the first current scale space to the right of the cycles scale, the other spaces to the right being filled with current scales for all the other relays with which the faulted relay must select.

The current scale spaces are provided with indices or movable markers to indicate the primary current flowing over the faulted feeder and also over the associated feeders. A straight edge is provided for visually projecting these markers to the left, or to the cycles scale, in order to determine the tripping time of each relay for the particular current value to which each marker is set.

A horizontal slot or space is provided at the base of the rack, below the zero line of the cycles scale and below the bottom of the current scales slots. This

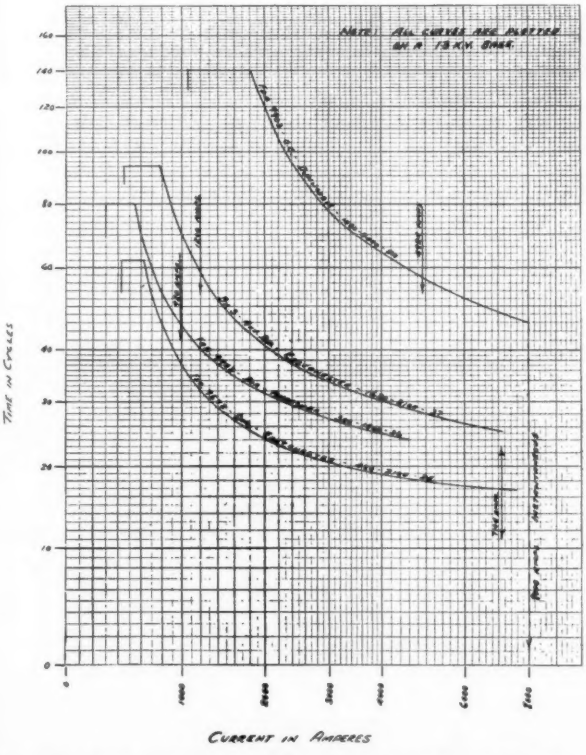

Fig. 3—Determination of Relay Selectivity for a Fault on Feeder 9572 at Eastchester

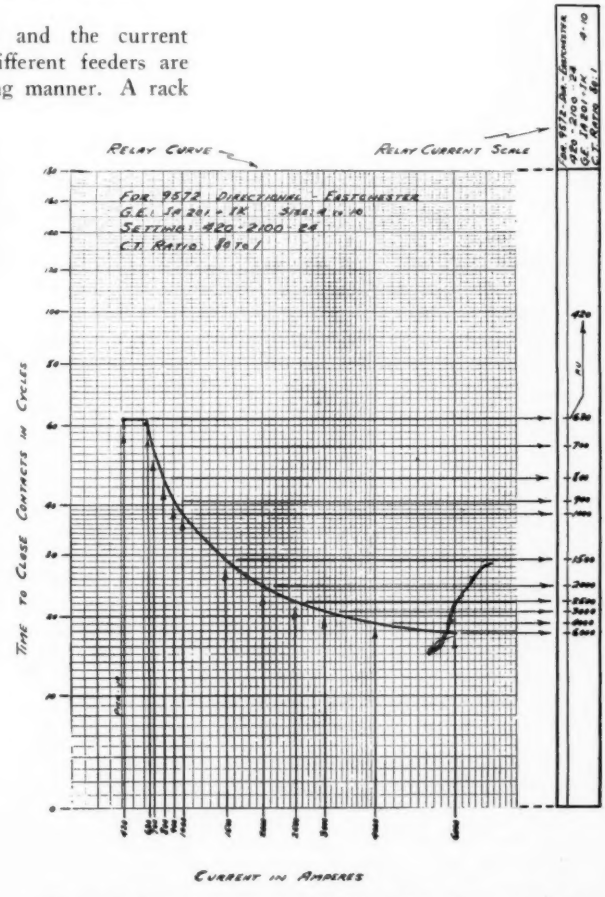

Fig. 4—Construction of Typical Relay Current Scale

space is 1¼ inch in width (the length depending on the length of the rack) and is furnished for the "selectivity scale." The selectivity scale is made up of a strip of paper 1¼ inch in width which is ruled vertically to correspond to the current scales placed above it. The left hand column will be placed under the first current scale, or in other words, under the current scale for the faulted feeder. The other columns to the right are placed to correspond with the other current scales in the rack. In these columns on the selectivity scale is placed the feeder designation and type of the protection according to the arrangement of the current scales in the rack above, together with the current flowing over each feeder under consideration, and the tripping time as determined by projecting across to the cycles scale by means of the straight edge. Thus the selectivity scale or table is nothing more than a tabulation of the results.

Instead of redrawing a group of relay curves to determine selectivity when the fault is considered on each of the various feeders at a substation, the rack can be used to advantage. The current scales can be rearranged in the rack so that the current scale for the faulted feeder will always be in the first slot to the right of the cycles scale, the current scales for the associated feeders being inserted in the remaining spaces to the right. The only changes that it will be necessary to make are in connection with the selectivity scales.

As an example in the use of the rack, a fault will be considered on Fdr. 9572 at Eastchester near the 13 kv Bus No. 2. The current scale for the directional relay on Fdr. 9572 at Eastchester will be placed in the first current scale space to the right of the cycles scale. The current scales for the other relays with which Fdr. 9572 directional relay at Eastchester must select will be placed in the additional spaces to the right. As each of the current scales is placed in the rack, the markers will be set or adjusted to the proper amount of current as shown in Fig. 5. Then these current scales will be placed in the rack in the following order from left to right and with the markers set to the following values of current on each:

1. Fdr. 9572 directional at Eastchester, 7104 amp.
2. Fdr. 9903 overcurrent at Dunwoodie, 4924 amp.
3. Bank No. 3, 4 kv directional at Eastchester, 1200 amp (at 13 kv).
4. Fdr. 9903 directional at Anaconda, 980 amp.

By means of the straight edge it will be possible to project these values of current over to the cycles scale, the results of this projection being inserted on the selectivity scale which will be arranged to correspond to the current scales above. Accordingly the selectivity scale will give the following information in the columns as indicated:

1. Fdr. 9572 directional at Eastchester, 7104 amp in 17 cycles.
2. Fdr. 9903 overcurrent at Dunwoodie, 4924 amp in 57 cycles.
3. Bank No. 3, 4 kv directional at Eastchester, 1200 amp in 58 cycles.
4. Fdr. 9903 directional at Anaconda, 980 amp in 45 cycles.

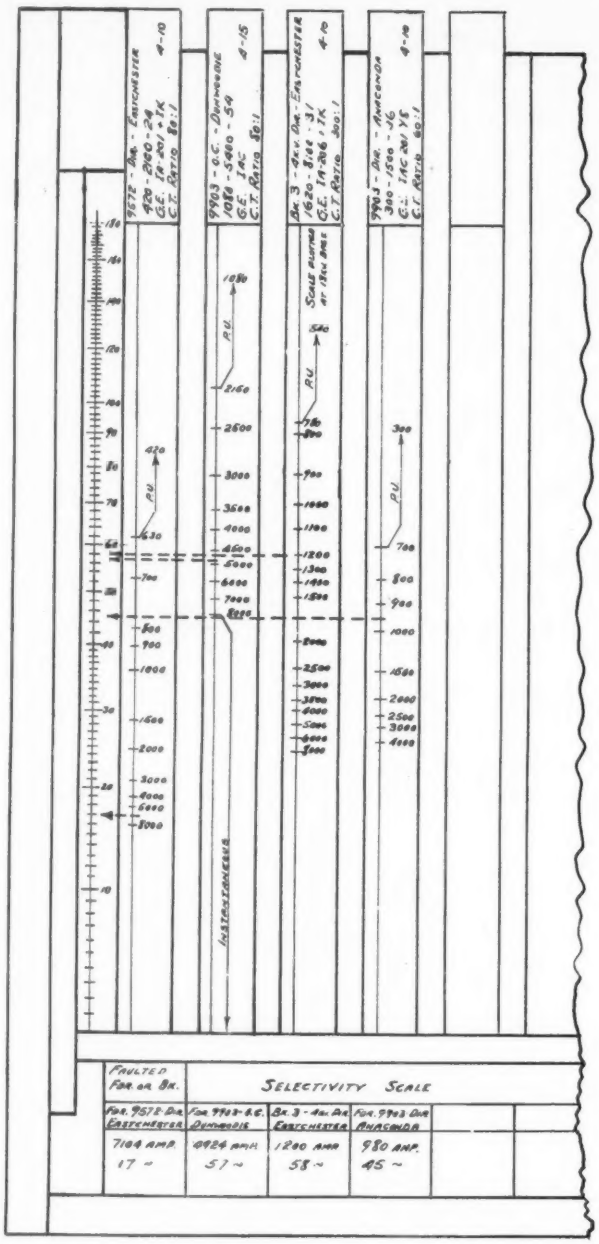

Fig. 5—Typical Rack Set-Up

Thus it can readily be seen that for a fault on Fdr. 9572 at Eastchester, the directional relay on Fdr. 9572 at Eastchester will be selective with the directional relay on Fdr. 9903 at Anaconda as there will be 45 minus 17 or 28 cycles clearance. The selectivity with the overcurrent relay on Fdr. 9903 at Dunwoodie and with the directional relay on the 4 kv side of Bank No. 3 at Eastchester will be 57 minus 17 or 40 cycles, and 58 minus 17 or 41 cycles respectively.

In the example just given a three-

phase fault was considered, and the corresponding currents were marked on the current scales. If a single-phase-to-ground fault is considered, this method is equally applicable, the markers being moved to the correct positions on the current scales to indicate the amount of current flowing over the grounded phase.

Some feeders may be protected by overcurrent ground relays in addition to the straight overcurrent relays, in order to secure greater selectivity on ground faults. The setting on ground relays is usually faster than on overcurrent relays, and on the current scale for ground relays it must be remembered that the value of current to which the marker will be set is that for residual ground current flowing over that feeder, or through that particular ground relay. Ground relays will operate only on residual ground current.

Summary

From the foregoing discussion it can be seen that the chief advantage in using the rack is that existing conditions of relay selectivity can be read very quickly. Current scales for the setting on each relay on the system will have been prepared, as explained previously. These scales can be filed alphabetically under each substation in numerical order according to feeder number, circuit number, bank number, etc.

When it is desired to find the existing selectivity of a certain relay setting with respect to associated relay settings, the following procedure is recommended:

1. A small one-line diagram is drawn similar to that shown in Fig. 2. This diagram should show the bus to which the faulted feeder is connected, together with all the other feeders and banks connected to this bus.
2. The total short circuit current is found for a fault on this bus, and this current value is prorated back over all the feeders and banks feeding this faulted bus.
3. It is necessary to go back further, to the buses at the far end of each feeder feeding the faulted bus, and to prorate the currents over the other feeders feeding these other buses.
4. Current scales, corresponding to the relay settings on all the feeders involved, are placed in the rack, the current scale for the faulted feeder being placed in the first slot to the right of the cycles scale on the rack. (See Fig. 5.)
5. The markers are placed on each current scale to indicate the current flowing over each feeder, and these current values are transferred under the corresponding current scales to the selectivity scale at the bottom of the rack.
6. The straight edge is lined up individually with the marker on each current scale and the corresponding values read on the cycles scales, these values being transcribed on the corresponding space on the selectivity scale.
7. By comparing the values of "cycles" obtained from the selectivity scale, it is possible to determine the "clearance" or "cycles of selectivity" obtainable between the faulted feeder and all the other feeders.
8. By changing the position or order of the current scales in the rack and by inserting a new selectivity scale in the slot at the bottom of the rack, the selectivity of any other faulted feeder at that substation may be found by following steps 4 to 7 inclusive.

The rack method of determining relay selectivity will eliminate several errors that very often occur when using the former method of relay fault curves. When replotting the same relay curve several times, it is highly probable that the curves will not all pass through exactly the same points. Under the rack method, however, only one current scale is used for a certain relay, and no matter how many times this one relay current scale may be used, corresponding values of currents and tripping times will always remain the same. Also when using relay curves, the fact that these curves may cross each other leads to confusion in marking the proper amount of current on the proper relay curve. This confusion will not result when using the rack method, as the current scales are separated from each other and the current value on each one is indicated individually by its own marker.

A real saving in time and labor when using the rack method of determining relay selectivity will be appreciated on studies involving system power swing. Assuming the capacity of the rack is twenty current scales at one time, the twenty fastest relay settings on the system can be selected and the corresponding current scales inserted in the rack. By moving the current markers on these scales according to various conditions of system operation during power swing, selectivity scales can be compiled for each condition. Thus for every condition of power swing considered, the drawing of twenty relay curves will be eliminated.

Progress Towards Transformer Production

(*Continued from page* 420)

appraising the availability situation. Statements at this conference confirmed that all manufacturers are tooling up for production of the transformers covered in the First Report, each maker working to a schedule consistent with its own specific situation as to stocks on hand and this, in turn, differing for individual sizes. On the whole, availability, it appears, will gradually increase during the fall and reach established deliveries by January, 1941.

While no price adjustments for the new standard transformers are being offered on earlier orders, assurance is given that in January, 1941, price levels reflecting reductions for the new standard transformers will be put into effect and sales procedure otherwise placed on a catalogue basis.

While a disappointment to many users, this postponement from overstocking in delivering the new standard transformers doubtless will prove of mutual benefit. Unless these stocks be promptly reduced to reasonably insure against prolonged carry-over charges, there must be expected, on the part of the makers, delay in giving full price reductions for the simplified new standard units. Losses from unused or long held transformers are passed on to the users, in one form or another, which is somewhat analagous to the situation now existing with regard to extra features at "no extra cost." At present many customers are requiring the addition of one or more features special to their individual preferences and frequently these are supplied without additional charge. While individual customers feel that they are getting "something for nothing," these extra items of cost are spread over all customers through holding prices at a higher level.

In the interim to generally established availability, operating companies desirous of getting started in using the new standard transformer are advised to maintain contact with the makers customarily supplying their needs, to take advantage of early deliveries as they become available for respective sizes, even though purchased at price levels prevailing for conventional transformers. Gain will be realized from experience in installing the new units and becoming better prepared to realize full benefits of the new standard when reduced prices are put in effect next January.

The Joint Committee is resuming its meetings this month in the second step of its work of extending the standards in the same voltage range, that is, 15 kv and below, to cover transformers up to 100 kva inclusive. It is anticipated that tentative proposals for these larger transformers will be ready for discussion at the October meeting of EEI T. and D. Committee in Atlanta.

MKB's Utility Water Heater Contest for 1940 Attracting Great Interest

INCREASING interest this year in the Modern Kitchen Bureau's electric water heating contest for utility companies has resulted from simplification of the rules and a broader distribution of prize money.

Three utilities will share among them $1,000 in prize money for the best all-round jobs of promotion and sales of electric water heaters during 1940, whereas only one prize was offered for 1939. Regulations for the contest have been simplified, making it easier for utilities to compete.

Rules for the contest make any operating utility in the United States eligible to compete. An entry will consist of comparative sales figures of electric water heaters for 1939 and 1940, including both dealer and utility sales; the estimated increase in saturation during 1940; and a complete description of the plan followed, together with samples of the sales and advertising materials used.

The judges, all of whom will be men prominent in electrical appliance advertising and merchandising, will score each entry on the following basis:

Excellence of Plan	10 per cent
Execution of Plan	40 per cent
Effective use of MKB materials	5 per cent
Percentage of sales increase over previous year	15 per cent
Number of electric water heaters sold per 1,000 domestic customers	20 per cent
Dealer co-operative activities	10 per cent
	100 per cent

The contest will close December 31, 1940, and entries, covering the entire 1940 record, must be postmarked not later than midnight of March 1, 1941. Entries must be forwarded to the Modern Kitchen Bureau, 420 Lexington Avenue, New York. They will become the property of the Bureau, and will not be returned. This contest offers a splendid opportunity for utilities interested in building water heater load to stimulate their entire sales organizations to increased effort and enthusiasm. Utilities planning to submit entries should notify the Modern Kitchen Bureau now of their intention to do so. Companies will find other MKB electric water heater contests valuable in building up good over-all records for the utility contest.

Three of these other contests have already been conducted earlier this year. One was for the best newspaper advertising of electric water heating, the winner being T. H. Kettle, Advertising Manager, Northern States Power Company. Second prize went to John G. Longsdorf, Indianapolis Power & Light Company, and the third to Fentress Tucker, of the Richmond, Indiana, Municipal Lighting Plant.

The second contest was for salesmen. This was an an essay contest on the subject: "The Toughest Electric Water Heater Sale I Ever Made." Carl I. Hellen, Wisconsin Electric Power Company, took first prize, with R. P. Little of Northern States Power Company and Ralph Hartsock of The Ohio Power Company in second and third place respectively. Five additional prizes were awarded.

The third contest was for the best window displays of electric water heaters. First prize went to Ohio Edison Company at Akron, and second prize to Idaho Power Company at Boise. Ten additional prizes were awarded. Results were announced some weeks ago.

The two remaining contests will repeat the window display prizes and those for salesmen's essays. A total of $250 is offered for water heater window displays, divided into a first prize of $100, a second prize of $50, and ten third prizes of $10 each. The contest closes January 15, 1941, and the displays must have been set up and photographed between July 1 and December 31, 1940. All that is required is a photograph of each window to be entered, together with a brief description of any movement in the display and of its color. Both dealers and utilities are eligible.

The fall contest for retail salesmen will distribute $75 in cash prizes, and in addition a grand prize of $100 for the best paper entered in either spring or fall contest. A letter to the Bureau on the subject "The Toughest Electric Water Heater Sale I Ever Made" is all that is required. Any retail salesman of electric water heaters, employed by a dealer or utility anywhere in the United States, is eligible. Entries must be postmarked not later than October 31.

Window Displays Winning First and Second Prizes in the Modern Kitchen Bureau's Spring Contest for Electric Water Heater Window Displays—Right, Ohio Edison Company, Akron; Left, Idaho Power Company, Boise.

Fluorescent Lighting Brings New Load Building Problems

By John E. Mueller
West Penn Power Company

From an address before the Westinghouse Lighting Conference, Bloomfield, N. J., June 17, 1940

SINCE fluorescent lighting came on the market a little more than two years ago the changes in life, efficiency and price have cut its cost more than half, I have been informed. This rapid change in economics has played its part in bringing about what might be termed the second period in the development and the sale and promotion of fluorescent lighting. This explains to a great extent why, until recently, a large portion of the lighting industry questioned if it was yet in the best interests of the customer to recommend fluorescent for general lighting purposes.

In the first period of the development of fluorescent lighting, immediately following its introduction, the sounder interests of the lighting industry confined its use to supplemental lighting applications, places where color for decoration was needed, or where daylight color quality was important; and also where radiant heat from local lighting applications was a factor. It was recommended for general illumination only where style considerations outweighed its high cost, or for higher levels above 50 footcandles, which could be handled better with a diffuse than a point source.

During this first period when, in general, fluorescent cost twice as much as incandescent lighting—and in specific instances many times more—the great majority of the industry was not promoting it for ordinary general lighting purposes. You can imagine the speed with which fluorescent lighting would have come into use if the lamps had cost very little more than incandescent lamps, and could have been screwed into an ordinary light socket. Perhaps it was just as well that this price barrier did exist, because the lamps, for various reasons, had been forced into premature marketing. Economics provided the barrier which allowed time for the solving of some of the original problems. These included such things as equipment for utilizing fluorescent lighting, sounder methods for correcting its power factor, progress in correcting its "fairy tale," exaggerated publicity and advertising, and its original disregard for Better Light-Better Sight principles.

Today fluorescent lighting costs are fairly comparable with incandescent lighting costs for a large number of general lighting applications where load factors run 20% to 30% and better. Of course, wide variations from this generality are still possible, and each individual job requires its own study. However, while fluorescent is not, and probably never will be, a cure-all for all lighting ills, it is now in a position where it is consistent with the customer's best interests and can assume its proper role as a lighting tool. As we move into the second period, fluorescent lighting should be aggressively promoted for general lighting purposes by the entire industry.

Moving from one period to another is always a matter of gradual transition. But if a date must be chosen for the start of this second period in the development of the promotion of fluorescent lighting it could probably be considered as March of this year, when the Industry Conference on Fluorescent Lighting was held in Chicago under the sponsorship of the Edison Electric Institute. At this time, also, a definite position was taken by the utilities as stated in the Policy of the Edison Electric Institute's General Sales Committee, representing about 85% of the utility industry.

As we move into this second period of fluorescent lighting, speaking now purely from the utility standpoint, our new load-building tool presents a number of problems if its progress is to be sound and orderly, in our best interests and in the best interests of the customers whom we serve and with whom we must live 365 days out of the year. The answer to a number of these problems is not yet obvious. However, a quick look at some of them may help us to focus our attention so that we can get busy and find their solution.

First, the problem of certification. Why? If the utilities don't start to take a real interest in certification, it will not become very effective. Certification today is represented principally by the RLM Standards Institute and the Fleur-O-Lier Manufacturers. The RLM Standards Institute has a specification for a two-tube industrial type fixture, with about seven manufacturers producing it. Fleur-O-Lier has a membership of about 32 companies, with about 24 fixtures certified so far, all but about three of which have been within the last two months.

Development has been slow because of all the problems. For instance, the Fleur-O-Lier Specifications have been difficult to write because they cover such a large number of applications. These specifications probably are still far from a fairly permanent form. Some of the larger manufacturers are not in sympathy with the movement because they feel they are equipped with experienced engineers and designers, and that the specifications place the so-called "tinsmith" in competition with the established manufacturers.

If a utility should decide to promote only certified equipment, and some of the better manufacturers are not in a position to provide it, this can lead to embarrassment and complications. I do not believe that fixture manufacturers in general feel that utilities strongly want certified fixtures. Utilities should take an active rather than a passive attitude and let their needs be known. For instance, if they want certification, then in their promotion the emphasis can be placed on certified equipment rather than giving all equipment equal prominence. Also, when a fixture manufacturer, even though he is a member of the certification program, brings out an entire catalog with no certified fixtures, or one at the most, or when the fixture manufacturer who has been part of the program for over a year has as yet no certified equipment, why shouldn't he hear

from us? Conversely, if the manufacturer is making certified equipment available, why shouldn't he get a pat on the back, or a complimentary letter to headquarters where it will do the most good?

Second, this problem of lost revenue. Except for the individual job, fluorescent lighting will probably not affect commercial or industrial lighting revenues sufficiently to show a new drop in revenue, or sufficiently to stop its upward trend. However, for those of us who report sales results in terms of revenue sold, fluorescent lighting will probably have a decided effect on our methods of reporting. Fluorescent lighting intensities sold have to be more than twice the original incandescent intensity, in order to show a revenue increase. Activities which have been building revenue, for example, at a cost of say, 50c per dollar, are going to become much more costly per dollar of revenue sold. Both the volume of revenue sold and the cost per unit will have to be taken into consideration this fall when setting up quotas and budgets for new business sales. This situation will probably be one of a temporary rather than a lasting nature. The length of time the condition exists will depend upon how rapidly the total and first cost of lighting drops, and also upon how soundly fluorescent lighting is promoted.

The third problem, that of power factor, at the present time is being handled in two ways. First, by a promotional method. This is dependent upon the fact that the advantages of good-power-factor equipment are being advertised and sold to the public and included in certification plans. It is also dependent upon the fact that power factor correction for 36-inch and 48-inch lamps can be obtained at practically the same cost as uncorrected equipment. These two sizes, of course, represent the bulk of the connected load. This method is gaining in effectiveness, but there is the danger that the economic balance has been struck too early in the development of auxiliaries, and may be changed by further developments.

The second method of controlling power factor is for utilities to have protective clauses either in the individual rates on in the rules and regulations. These clauses are of two types; one requires a minimum overall power factor at the meter; the other a minimum power factor for each individual device connected to the lines. Such practices are being initiated either by the individual utilities or by the state regulatory commissions, and are in effect in California, Wisconsin, Oklahoma, Connecticut, Minnesota, and parts of New York, Rhode Island, and Michigan, to mention a few locations.* Such clauses, by and large, are proving effective, but the problem here is the administration of the policy, particularly for the smaller pieces of equipment, which at times gives rise to discrimination and public relations problems.

There are noticeable signs of more activities along the premise of giving the customer anything he wants as long as he is willing to pay for it. For large accounts this represents no problem. However, for smaller customers this involves developing a method for charging for poor power factor. A number of studies are in progress to determine ways of measuring power factors for smaller customers, some of which show promise.

Another problem which is extremely important is the threat of severe competitive situation. One large lamp company also makes a complete fixture, peddling this from door to door directly with their own salesmen and a large number of jobbers and dealer salesmen. This expansion has been so rapid that training has not been very effective to date, and the caliber of the selling has resulted in a number of inferior jobs. It has, however, been effective in building up a fair volume of equipment sales. There has been some threat that the Mazda interests, in order to combat this competition, would start a similar operation through their equipment jobbers. Of course, a large number of lighting salesmen can be a boon to the industry. However, a large number of poorly trained salesmen not selling lighting, but selling equipment on the basis of current saving, can overthrow the whole Better Light-Better Sight movement, and demoralize the entire industry for years to come.

Outside of isolated instances which have come to my attention, this is still more of a threat than an actuality. However, there are lots of rumors floating around, and this situation demands the critical attention of the utilities as plans for fall lighting activities of the various interests become more fully developed.

Fluorescent lighting development has been so rapid that the problem of proper training for the whole lighting industry has become acute. The utilities, as one of the larger components of the lighting industry, not only have the problem of training their own personnel, but also should assume their share of responsibility for training the contractors, dealers, architects, and share in the training of distributors' and manufacturers' salesmen.

In a recent meeting I displayed an electrical contractor's fluorescent ad which was similar to a number of those that we have seen. It featured how many more times efficient fluorescent lighting was than incandescent lighting, and emphasized that the saving in electricity would pay for the installation in a short time. The interesting point was that this ad was written by a newspaper man based on the fluorescent lighting literature and catalogs which the dealer made available to him out of his files.

While the lamp companies are to be complimented on the constructiveness of their recent promotional materials, there is still a large amount of questionable publicity material being released from other sources. A number of utilities, instead of just looking at this material and complaining about it among themselves, are taking "pen in hand" and constructively criticizing the material to the authors, where it has a chance of accomplishing something. It is recommended that this practice be engaged in by still more utilities so as to acquaint all parties with their attitude, as well as to serve as a training. Such criticism has already proved effective, and in many cases is welcomed by the company involved because of their limited knowledge and lack of proper information.

The last problem I would like to mention is that of raising our sights. We all cheerfully say—"With our fine new tool, fluorescent lighting, what we want to do instead of selling 25 foot-candles is to go out now and sell 50 foot-candles or more." But why? As far as the customer is concerned, why shouldn't he say—"What are the boys trying to do—selling me 25 foot-candles of incandescent, or if I go to fluorescent, selling me 50 foot-candles? If 25 foot-candles is right in one place, why isn't it right in the other?" There are some answers to this. For instance, you need very nearly twice as much daylight fluorescent lighting to get the same feeling of light as when using incandescent lighting, and also to get away from bluish, cold effects and have a real daylight appearance, with the

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*Many additional states today.

E.E.I. Committees Are Ready for New Problems

THE committees of the Edison Electric Institute begin their work this fall with a full consciousness of unusual conditions confronting the industry. The national defense program is already getting well under way and as the program proceeds and develops, its inevitable repercussions throughout the nation's economic life must affect, in some degree, every activity of a business as vital as the electric utilities.

There is no doubt that the industry can and will answer every call made upon it by the country. But there is a realization that the situation imposes a special responsibility: to make sure that any changes in plant, operations and policy are directed along lines not only to meet immediate requirements but also to the ultimate best interest of the nation and its people. And management, as always, will rely heavily for aid in solving its problems on the pooling and interchange of experience through good committee work.

The necessity for more than ordinary alertness to current conditions has been recognized in the initial organizational activities of the committees. Chairmen are planning work so that new problems will receive consideration at their onset and be followed throughout their evolution.

Accounting Committees

The accounting committees of the Edison Electric Institute for the present administrative year have been organized and operations divided into five functional groups; namely, (1) Classification of Accounts; (2) Customers' Relations, Commercial Accounting and Collections; (3) Depreciation; (4) Plant Accounting and Records and (5) Purchasing, Stores and Transportation. The Accounting Executive Committee acts as a steering committee, coordinates the work of these five functional groups, and furnishes advice and promotes discussions of other accounting matters that are not directly under the scope of the functional groups. The personnel of these committees is comprised of 117 individual committee members representing some 60 companies, covering each geographical section of the industry.

For the coming year efforts are being directed toward furtherance of a closer cooperation with the members of the American Gas Association Accounting Section, and arrangements have been made to make the Fourth National Accounting Conference a joint meeting of the accounting members of both associations.

The Accounting Conference

The Conference this year will be held on December 2, 3 and 4 in Detroit, Michigan, at the Book-Cadillac Hotel. The principal theme of this Conference will be a consideration and discussion of the problems relating to increasing costs. The Conference will be headed by G. H. Bourne, Chairman of the Accounting Executive Committee of the Edison Electric Institute and E. N. Keller, the incoming Chairman of the American Gas Association Accounting Section, who will act as co-chairman. To assist in the plans, programs and other matters incident to the Conference, a Planning Committee has been appointed under the joint leadership of Mr. B. S. Rodey, Jr., past Chairman of the EEI General Accounting Committee, and Mr. F. B. Flahive, present Chairman, AGA Accounting Section, who have had considerable experience in the promotion of accounting conferences and have contributed greatly in the work of their respective associations. The other members of the Planning Committee are L. A. Mayo, J. H. Lobban, Emil Ulbricht, H. B. Hardwick, A. S. Corson, and Merle Rainey for the EEI, and S. J. Barrett, O. H. Ritenour, L. L. Dyer, H. C. Hasbrouck, H. E. Cliff, J. A. Williams and O. W. Brewer for the AGA.

Engineering Committees

While committee activities in the Accounting and Commercial fields have come, by an evolutional process, to be organized under the direction of general committees of an executive nature, thus reproducing in a measure the sectional type of organization that existed prior to 1933, the engineering committees, on the other hand, have remained structurally independent of one another, fulfilling needs for coordination by group meetings and more or less continuous inter-committee conferences.

The engineering group of committees comprises the Prime Movers Committee, dealing with steam power production; the Hydraulic Power Committee, dealing in a corresponding way with hydraulic power production; the Electrical Equipment Committee, which covers inside electrical plant, general system engineering, and the increasing problems of utilization; the Transmission and Distribution Committee, which covers outside plant and related problems of systems engineering such as coordination with foreign systems; the Meter and Service Committee, dealing with the technology of meters and customers service problems; and the Accident Prevention Committee, which covers the problems of safety throughout the entire plant.

The coverage as provided in the detailed scopes of these committees is such as to provide a forum and a reservoir of technical information on practically any technical problem that may arise, as they do continually arise, in the course of the development of the art of electric power supply.

Special Engineering Problems

New and special engineering problems do enter, of course, extensively and often decisively, in many of the broader matters of management, operation and construction. In such matters it has been found that, when they are susceptible of committee treatment at all, they can be dealt with advantageously by special committees, hand picked for the purpose, so to speak, from individuals who might otherwise have been material for an executive committee. In view of the diverse nature of the problems that have been dealt with in this manner it has appeared that this method is superior to that of having a committee of this kind permanently organized.

At present the personnel of the permanently organized engineering committees consists of 186 engineers, broadly representative of all sections of the country and the Institute's membership. Personnel of the special committees varies with the problem under consideration and its particular needs.

A meeting of the Accident Prevention Committee is scheduled for October 24 and 25. The Electrical Equipment Committee will hold its initial meeting of the administrative year on October 7 and 8:

G. H. BOURNE
Chairman, Accounting Executive Committee

R. E. FISHER
Chairman, General Sales Committee

H. L. GRUEHN
Chairman, Depreciation Committee

H. B. HARDWICK
Chairman, Plant Accounting and Records Committee

MR. BOURNE, the new chairman of the Accounting Executive Committee, began work with the predecessor of his present company, the Commonwealth and Southern Corporation, in 1906 and was assistant secretary and assistant treasurer when he enlisted in the Army in 1918. He returned to become secretary and treasurer and, in 1928 was elected assistant controller. Took similar position upon formation of the Commonwealth and Southern, which in 1934 elected him controller. Mr. Bourne has been an active member of the Controller's Institute of America since 1933.

MR. FISHER assumes the chairmanship of the General Sales Committee with an enviable record of accomplishment in the sales field, both with his company and in association activities. He is vice-president of the Pacific Gas and Electric Company in charge of public relations and sales. He entered the employ of P. G. & E. in 1911, becoming manager of the commercial department ten years later. In 1922 he was elevated to his present position. He served for two years as chairman of the Pacific Coast Electrical Bureau, has been president of the Pacific Coast Electrical Bureau, president of the Pacific Coast Gas Association, president of the Pacific Coast Electrical Association and of the San Francisco Electrical Development League.

MR. GRUEHN has been secretary and assistant treasurer of the Consolidated Gas Electric Light and Power Company of Baltimore since 1937. Earlier he had served in various executive capacities in the accounting field with that company and also with the United Gas Improvement Company. The new chairman of the Depreciation Committee has been a member of the Accounting Executive Committee since 1936. He also holds the distinction of having won in 1928 and in 1930 the H. M. Byllesby prize for papers on accounting subjects. He is a graduate of the University of Pennsylvania.

MR. HARDWICK is one of the younger group of accounting executives to hold appointment as chairman of an important committee. Educated in the public schools in Alabama and Alabama Polytechnic Institute, from 1918 to 1925 he was employed by the Alabama Power Company in accounting work. In 1925 he joined the staff of Southeastern Power and Light Company which merged with the Commonwealth and Southern Corporation in 1930. He is now assistant comptroller of the Commonwealth and Southern Corporation and comptroller of Pennsylvania Power Company, New Castle, Pa.

A. M. HARTOGENSIS
Chairman, Classification of Accounts Committee

E. L. HOPPING
Chairman, Prime Movers Committee

H. P. LIVERSIDGE
Chairman, Prize Awards Committee

L. A. MAYO
Chairman, Customers' Relations, Commercial Accounting and Collections Committee

MR. HARTOGENSIS spent several years in industrial cost accounting, four of them in Alaska after his discharge from the Army in 1919. In public utility accounting since 1926, first with American Water Works and later with Electric Bond and Share. He has assisted in the development of simplified uniform system of accounts for electric utilities and has done extensive research and analysis of present Federal and State uniform systems. He is consulting accountant for Ebasco Services, Inc.

MR. HOPPING has been outstandingly active in the work of the Prime Movers Committee of both the Institute and its predecessor organization. As mechanical engineer for the Philadelphia Electric Company, he is prominently identified with the design and construction of the Richmond Station and the topping of the Schuylkill Station. He is also a member of the A.S.M.E.

MR. LIVERSIDGE, as Chairman of the Prize Awards Committee, exemplifies the busy executive genuinely concerned in encouraging attainment of a high order in both personal efforts and general operating efficiency. He has been with the Philadelphia Electric Company since 1898, serving in numerous posts, and becoming president in 1938. Prominent in civic, educational and industrial activities, he is a member of the E.E.I. Board of Trustees; past chairman, Philadelphia sections of the A.I.E.E. and A.S.M.E. and past president, A.E.I.C. Graduate, Drexel Institute; Doctor of Engineering (Hon.) Stevens Institute of Technology.

MR. MAYO's background for the chairmanship of the Customers' Relations, Commercial Accounting and Collections Committee is 23 years of accounting experience, 19 having been devoted to public utility work. Since 1929 he has served the Connecticut Light and Power Company as supervisor of local accounts in charge of district accounting offices, systems, methods, centralized billing department and internal traveling audit department. From 1921 to 1929 he was with the predecessor company in various capacities, including office manager, purchasing agent, auditor.

G. McDOUGALL
Chairman, Purchasing Stores and Transportation Committee

W. T. NEEL
Chairman, Statistical Committee

F. A. NEWTON
Chairman, Rate Research Committee

J. H. NICKELL
Chairman, Insurance Committee

MR. McDOUGALL has been actively engaged in public utility accounting since 1907, specializing in commercial, stores and general accounting fields. Now assistant controller, Consolidated Edison Company of New York, Inc. He was formerly assistant treasurer of the United Electric Light and Power Company and assistant auditor of New York Edison Company, both predecessors of Consolidated Edison. His organizational and administrative experience includes former presidency of the Association of Employees of United Electric Light and the vice-chairmanship of the Committee he now heads.

MR. NEEL is chief statistician of the Philadelphia Electric Company. He is an ex-teacher and college professor and is a graduate of Washington and Lee University. Formerly an engineer with Jackson & Moreland, consulting engineers. His first association with the electric industry was as operating superintendent in 1915; since 1930 has been engaged in statistical work. He has been an active member of the Statistical Committee since 1937.

MR. NEWTON is a pioneer in progressive public utility rate making. Long a member of the Institute's and its predecessor's Rate Research Committee and for several years its chairman, he is credited as the originator of the history-making objective rate plan first put into operation by companies of the Commonwealth and Southern group. He has addressed many meetings throughout the country on rate matters and is the author of numerous articles on electric utility rates, valuations, taxation and related subjects.

MR. NICKELL heads the Insurance Committee with broad and distinguished experience in that field. Insurance manager for the Philadelphia Electric Company, he has been with that company since 1908, for the past 22 years handling its real estate and insurance problems. In 1938 American Management Association elected him vice-president in charge of insurance division. He is also chairman, Insurance Committee, Pennsylvania Electric Association; member, Insurance Committee, National District Heating Association; member, Insurance Committee, American Gas Association, and a founder and director of Risk Research Institute, Inc.

W. F. NIMMO
Chairman, Transmission and Distribution Committee

W. R. SMITH
Chairman, Accident Prevention Committee

E. B. STROWGER
Chairman, Hydraulic Power Committee

R. W. WILBRAHAM
Chairman, Electrical Equipment Committee

MR. NIMMO went in 1919 from the Army where he was a captain of Infantry, AEF, to the Virginia Electric and Power Company. In the past 21 years he has served the company in various capacities, having been appointed general distribution engineer five years ago. A past chairman of the Virginia Section, A.I.E.E. he has also been active in Southeastern Electric Exchange engineering and operations section and has been a member of the Transmission and Distribution Committee, E.E.I., since 1934.

MR. SMITH has been associated for more than 25 years with the engineering and construction work of the electric system of the Public Service Corporation of New Jersey. He was in responsible charge of all electrical construction work from 1917 to 1924 and of the Electrical Engineering Department from 1924 to 1928. Since 1928, Assistant Chief Engineer, Newark Office, United Engineers and Constructors, Inc., and transmission construction engineer, Public Service Electric and Gas Company, having been appointed to position of Safety Engineer, May 1, 1938. Fellow of A.I.E.E.; Member, A.S.S.E.; A.I.E.E. Committee on Safety; vice-chairman, Safety Code Correlating Committee, A.S.A.; chairman, Committee on Cooperation with Engineering Societies, N.S.C.

MR. STROWGER has been associated with Niagara Hudson system companies since 1919, beginning as draftsman and designer for Niagara Falls Power Co. after graduation from the University of Rochester. Engineer of hydraulics 1925-1930, he was appointed hydraulic engineer of the Niagara Falls Company and other companies of the Niagara Hudson system in 1930. He is a member of the Executive Committee, Hydraulic Division, and Power Test Committee on Hydraulic Prime Movers, A.S.M.E. and has been chairman of the E.E.I. Hydraulic Power Committee since 1937.

MR. WILBRAHAM, new chairman of the Electrical Equipment Committee has been designer and constructor for over thirty years of generating plants, transmission and distribution systems, electric railways and industrial electric systems in 17 states, including many major projects involving new developments; also extensive consulting and investigating work. A native of Philadelphia and graduate of University of Pennsylvania, he has served on many industrial committees; Chairman, A.E.I.C. Committee on Electric Switching and Switchgear, 1930-1935; in 1936, Chairman, Electrical Round Table, Third World Power Conference.

the Meters and Services Committee on September 26; the Transmission and Distribution Committee on October 14 to 16 and the Prime Movers Committee on October 7 and 8. Notices and programs of these meetings are carried elsewhere in this issue.

Insurance Committee

The Insurance Committee's work includes cooperation with insurance organizations on matters of common interest, keeping informed as to rates and forms of coverage for all kinds of insurance and current insurance practices and the study of methods of fire prevention. Particularly it has been extremely useful in its advice and assistance to members with unusual insurance problems. Many substantial benefits have accrued to member companies through the deliberations and negotiations of leading insurance experts of the industry working together in the Insurance Committee.

Prize Awards Committee

A feature of the Institute convention each year is the announcement and presentation of prizes and awards. These awards have grown through the years until there are now 33 prizes, 11 to companies and 22 to individuals, including a total of $5,250 in cash as well as trophies, plaques and certificates. They are administered for the various donors by the Institute through its Prize Awards Committee, with judging of the competitions being done by men selected by the committee for their expert knowledge in the fields affected.

Rate Research Committee

The Rate Research Committee is a continuously functioning group in day-to-day contact with the rate problems of the industry. Through the annually published Rate Book, its Rate Digests issued two or more times a year, through informal studies of special rate questions and particularly through the informal meetings of the committee, representing the membership of the Institute, the committee is rendering a highly important service to the industry in its compilations, studies and reports on rates, rate making, rate application and theory.

Competitive conditions and public agitation of rate matters have made the work of this committee of particular importance to operating companies during the past few years, during which time there has been probably no significant rate problem that has not been considered by the committee. In addition to its particularized functions, the committee also promotes close cooperation with other committees in matters of mutual interest.

Sales Committee

The General Sales Committee starts the new administrative year with two additional subsidiary committees: a Traffic Appliances Committee, which will have as its specific function the promotion of the smaller appliances, and a Home Service Committee. Other committees in the Sales Group are the Air Conditioning Committee; Electric Water Heating Committee; Farm Sales Committee; Home Lighting Equipment Sales Committee; Lighting Sales Committee; Power and Heating Sales Committee; Utility-Dealer Sales Committee and the Wiring Committee.

An account of the committee's extensive program for the year will appear in the next issue of the BULLETIN. A meeting of the General Sales Committee is scheduled for October 4 at Hot Springs, Va.

Statistical Committee

The work of the Statistical Committee has for the past several years consisted largely in rendering advice and counsel to the Institute's statistical department in the matter of revised statistical forms, revised industry data and reclassification in light of the changes in the classification of accounts to insure adequate presentation of information concerning the industry as a whole.

The committee is also engaged in cooperative efforts toward the elimination of duplication and the simplification of governmental questionnaires, with indication of at least partial success in this direction, but the matter still needs further serious consideration.

Following the publication of the U. S. Census figures on Population, Agriculture and Housing, the committee plans to sponsor preparation of additional basic general data in such form that it will be most useful toward a better understanding of the electric light and power industry both as to its present development and its potentialities. In addition, these basic data should be most useful to the several committees of the Institute in their work and ought to eliminate much of the detail statistics now requested by governmental authorities.

Meter and Service Committee Meeting

F. E. DAVIS, *Chairman*

The fall meeting of the Meter and Service Committee will be held at the Hotel President, Kansas City, Mo., on Sept. 26, 1940.

The agenda includes subcommittee reports on the following subjects: Standardization of Current Transformers for Primary Circuits; Meter Bearings; Metering of Low Factor Loads; Adoption of Standard Dial Constants; Service Cable; Standardization of Demand Register Scales; Standardization of Thermal Demand Meter Ratings and Scales; Standardization of Color Coding of Demand Register Motor Leads; Uniform Marking of Meter Disks; Meter Pilot Lamps; Material for Terminal Blocks.

Insulation of Low Voltage Metering Equipment; Service Entrance Devices; Metering of Unusual Types of Loads, Cyclometer Registers; Summary of Public Utility Commission Rules; Revision of Code for Electricity Meters; Revision of Bureau of Standards Circular No. 56; National Electrical Code; Promotion of Standards and Issuance of Printed Standards.

Fluorescent Lighting Brings New Load Building Problems

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warmer colors such as red and brown showing up satisfactorily. While not true to the same extent when using the white lamp, you still need a higher intensity to have the same feeling of light as when using incandescent.

Other reasons are that we have never used the amount of light we should have, either for seeing or selling, but have been limited by such practical things as the effect of too much heat, or additional air conditioning costs. If on a particular job 50 foot-candles of incandescent lighting was the practical limit before, fluorescent lighting now permits the use of 100 foot-candles within the same practical limits of heat and air-conditioning cost.

I could mention other reasons, and so could you. But the point is that we need still more reasons, which is a challenge to the lighting industry. Fluorescent lighting is a new tool which gives us and our customers the opportunity to reach beyond the 40 or 50 foot-candle level of incandescent lighting. Let's accept this challenge and find out why and how to move forward.

Programs

E. E. I. Engineering Committee Fall Meetings

ACCIDENT PREVENTION COMMITTEE

W. R. SMITH, *Chairman*

Edison Electric Institute Headquarters, October 24 and 25, 1940

The 15th meeting of the Accident Prevention Committee will be held at Edison Electric Institute Headquarters, 420 Lexington Avenue, New York City, on October 24 and 25, 1940. There will be sessions both morning and afternoon, the morning sessions convening at 9 A. M. and the afternoon sessions at 2 P. M.

At the afternoon session October 24, which will be devoted to the subject of Resuscitation and associated topics, there will be shown to the Committee by Dr. W. B. Kouwenhoven, Dean of Engineering, The Johns Hopkins University, a motion picture recently made by him in connection with his investigation of Pole Top Resuscitation. Results of Dr. Kouwenhoven's investigation are being presented at the forthcoming District Meeting of the American Institute of Electrical Engineers at Cincinnati on October 11, 1940. It is anticipated that Dr. H. B. Williams, Chairman of the Edison Electric Institute Resuscitation Review Board will attend this session of the committee meeting together with such other members of the Board as may be in a position to do so and participate in the discussion of this matter.

The following program indicates the order in which the various topics which come regularly before this Committee will be considered:

OCT. 24—9 A.M.

Accident statistics report on 1940 data to October 1.

Cause and Location data: Discussion of reports for 1938 and 1939 and approval of form for future reporting.

Discussion of the most serious aspects of the following subjects as indicated by recent experience:

Traffic Hazards, Line Hazards, Low Voltage Hazards, Accidents to Office and Commercial Department Employees, Public Safety—Kite Flying.

The Electric Fence and report on plan for educational work in this connection.

OCT. 24—2 P.M.

General discussion: Resuscitation and Associated Topics. Report by Chairman of progress of Resuscitation Review Board. Discussion of Pole Top Resuscitation.

Employee Health and Physical Reexaminations.

OCT. 25—9 A.M.

Rubber Protective Equipment—Protective Equipment Miscellaneous.

Lineman's Handbook—Employee Training.

Reports of Liaison Representatives: Edison Electric Institute Committees.

Reports of Liaison Representatives: Non-Edison Electric Institute Committees.

OCT. 25—2 P.M.

Discussion: Operating Routine, Hold-off Procedure, Conditions Under Which Work in Vicinity of Operating Equipment is Done.

Discussion—Specific Accident Cases.

Report on New Devices, Procedure, Methods, Results of Tests.

Outline of Committee Organization and Appointments for the Coming Year.

ELECTRICAL EQUIPMENT COMMITTEE

R. W. WILBRAHAM, *Chairman*

Hotel Jefferson, Richmond, Virginia, October 7 and 8, 1940

OCT. 7—9:30 A.M.

CLOSED SESSION—(Attendance limited to members, and guests sponsored by members or the chairman)

Apparatus and Design Division

B. VAN NESS, *Chairman*

Apparatus Troubles ..... C. A. CORNEY

(a) Report on Equipment Failures.
(b) Air Circuit Breaker Experiences.
(c) Informal Discussion of Apparatus Troubles.

Oil Fire Reports ..... R. N. CONWELL
Joint Committee Circuit Breaker Report ..... R. T. HENRY
Radio Interference Factors of Apparatus ..... J. O'R. COLEMAN
Modernization Report ..... L. BIRCKHEAD
Circuit Breaker Tests ..... C. M. GILT
Switchboards, Circuit Breakers and Enclosures ..... E. B. SHEW

OCT. 7—2 P.M.

CLOSED SESSION—(Attendance limited to members, and guests sponsored by members or the chairman)

System Engineering Division

H. C. FORBES, *Chairman*

Study of System Load Swings ..... J. E. MCCORMACK
Generating System Capacity Reserves ..... K. F. BELLOWS
Intersystem Power Exchange Practices ..... C. W. MAYOTT

Operating and Maintenance Division

H. S. FITCH, *Chairman*

Fault Anticipator ..... E. H. SNYDER
Guarding and Lighting Stations ..... H. S. FITCH
Rehabilitation of Insulating Oils ..... H. S. FITCH

Utilization Division

J. H. FOOTE, *Chairman*

Survey of Motors Supplied from 3-Phase Secondaries ..... J. H. FOOTE

OCT. 8—9 A.M.

OPEN SESSION

Utilization Division

J. H. FOOTE, *Chairman*

Final Report of AIEE Subcommittee on Power Supply for Welding Operation ..... L. W. CLARK
Utilization Voltage Terms and Definitions ..... C. E. ARVIDSON
Progress Report on Utilization Voltage Studies ..... C. E. ARVIDSON

Operating and Maintenance Division

H. S. FITCH, *Chairman*

Storage Batteries ..... O. B. BENSON
Principles of Hold-Off ..... H. S. FITCH

Apparatus and Design Division

B. VAN NESS, *Chairman*

Generator Insulation and Testing ..... C. M. GILT

OCT. 8—2 P.M.

OPEN SESSION

Meters and Services Division

A. E. SILVER, *Chairman*

Meters and Services ..... F. E. DAVIS

Foreign Practice Division

A. V. DEBEECH, *Chairman*

Report on Information Received ..... A. V. DEBEECH

Miscellaneous

Rubber Gloves ..... N. STAHL

TRANSMISSION AND DISTRIBUTION COMMITTEE

(Preliminary program—subject to slight changes)

W. F. NIMMO, *Chairman*

Henry Grady Hotel, Atlanta, Georgia, October 14 to 16, 1940

CLOSED SESSIONS—(Attendance limited to Committee Members and Representatives of Utility Companies)

OCT. 14—9:45 A.M.

Underground Group

T. G. HIERONYMUS, *Chairman*

Methods of Cable Identification ..... FRANK KARGLE
Impulse Tests Showing Improvement in Surge Strength of Cable Insulation ..... G. B. MCCABE
Submarine Cable Crossing ..... E. F. NUEZEL
Progress Reports ..... *Subcommittee Chairmen*
Cable Operations ..... J. O'R. COLEMAN
Non-Inflammable Liquid Filled Transformer Operation M. W. GHEN
A-C Network Operation ..... C. W. FRANKLIN
Temperature of Cable in Underground Ducts ..... W. B. ELMER
Round Table Discussion of Layout of Junction Manholes for Low-Voltage A-C Networks.

OCT. 14—2 P.M.

Underground Group

Round Table Discussion.
Discussion of Experience with Varnish Cambric Cable Insulation.
Discussion of Restoring Service on 4 Kv Feeders After Primary Fault.
Discussion of Maximum Possible Cable Ratings.
Discussion of Cable Pulling Methods and Equipment.
Discussion of Low Cost Network Transformer Design.
Discussion of Sectionalizing Devices for Distribution Voltages in Areas Where Development Would Not Justify Networks.
Discussion of Upper Limit of Cable Lengths for Duct Installation.
General Round Table Discussion.

OCT. 15—9:30 A.M.

Overhead Transmission Group

D. M. BUNN, *Chairman*

Rebuilding Single Pole 66 kv Transmission Line to 110 kv Operation J. F. PENNINGTON
Discussion of Mr. Pennington's Paper ..... H. B. ROBINSON
Operating Performance and Maintenance of 132 kv Line Between Louisville and Cincinnati ..... G. M. MILLER and P. B. STEWART

General Session

W. F. NIMMO, *Chairman*

A Supply Company's Responsibility ..... R. R. COWLES

Cooperative Projects Group

H. A. DAMBLE, *Chairman*

Report on Group Activities ..... H. A. DAMBLY

Plant Coordination Group

W. F. DAVIDSON, *Chairman*

Report on Group Activities ..... W. F. DAVIDSON

OCT. 15—2 P.M.

Overhead Distribution Group

G. H. FIEDLER, *Chairman*

Report on Group Activities ..... G. H. FIEDLER
Summary of Report on Lightning Protection of Distribution Transformers ..... L. G. SMITH

Street Lighting Subcommittee

W. B. ELMER, *Chairman*

Street Lighting in Kansas City—A Series System ..... C. C. CORNELIUS

Transformer Field Load Testing Subcommittee

F. E. SANFORD, *Chairman*

Review of Subcommittee Project and Progress Report on Final Publication ..... F. E. SANFORD
Diversity Demand Method of Estimating Residential Transformer Loads ..... C. E. ARVIDSON

Utilization Voltage Subcommittee

C. E. ARVIDSON, *Chairman*

Review of Utilization Voltage Program to Date ..... C. E. ARVIDSON
Voltage Terms and Definitions.
Voltage Drops in Radial Overhead Distribution Circuits.
Prepared Discussion of several committee members.

OCT. 16—9 A.M.

Standards and Specifications Group

E. V. SAYLES, *Chairman*

Report on Group Activities ..... E. V. SAYLES
Distribution Transformer Standards ..... A. E. SILVER
Distribution Fuse Subcommittee ..... C. C. CORNELIUS
Report of EEI-NEMA Joint Committee Meetings ..... L. G. SMITH
Timber Products Subcommittee ..... L. G. SMITH
Fir Crossarm Specification ..... L. G. SMITH
Report on Treatment of Fir Crossarms ..... L. G. SMITH
Report on Inspection of Standing Poles ..... L. G. SMITH
Report on Line Hardware Specifications ..... E. H. KENDALL
Round Table Discussion.

OCT. 12—2:30 P.M.

Inspection Trips.

PRIME MOVERS COMMITTEE

E. L. HOPPING, *Chairman*

Hotel Wm. Penn, Pittsburgh, Pa., October 7-8, 1940

The fall meeting of the Prime Movers Committee will be held at the Hotel Wm. Penn, Pittsburgh, Pa. on Monday and Tuesday, Oct. 7 and 8. The meeting on Monday morning will start at 9:30 A.M. and the meeting on Tuesday morning will start at 9:00 A.M.

The Chairman of each of the subcommittees will report on the work of his group, and in many cases the statements of the subcommittee, for inclusion in the report, will be available for review by the committee. The Boiler Combustion Report is in the hands of the Editing Committee, but the subcommittee statement for this report is to be reviewed by the committee as a whole.

J. A. Keeth will conduct the round table session. The items to be brought up in this discussion have been circulated to all members of the committee so as to allow for previous study and thereby expedite discussion.

Tentative arrangements have been made for inspection trips to the plants of the Duquesne Light Company and to the laboratory of the Westinghouse Electric and Manufacturing Company. The exact arrangements for these trips will be made after the number of members making each trip, and the most convenient time, is known.

All sessions of the Prime Movers Committee will be closed sessions where the attendance is limited to members of the committee and guests sponsored by members or by the Chairman.

No Evidence of Damage to Water Pipes by Alternating Current Found by Grounding Committee

IN investigating 21 grounding cases during the past year, the Technical Subcommittee of the American Research Committee on Grounding found no evidence to indicate that the flow of alternating current over water pipes or mains had by itself caused damage to the piping or the water, according to the report presented at the Committee's annual meeting, held June 29, at New York. The committee stated, however, that investigations have not yet gone far enough to prove that such damage could not occur. It recommended continuation of investigation of all complaints of contamination of water where grounding of electrical circuits is involved.

The subcommittee report, which reviewed the progress made during the year, also included the findings of fundamental laboratory studies in polarization and other grounding problems.

The 21 investigations were made in cases brought to the attention of the committee by associated organizations, and involved studies in seven separate communities. In most of the cases the subcommittee investigated conditions in adjacent and nearby residences in order to establish any differences that might account for the variations.

In one situation involving a complaint of blue stain, studies were made of the conditions in five separate houses, all of which were built within the last year or two and were more or less alike in construction and equipment. They all had copper water service pipes from 30 to 50 feet in length, and the interior piping was of copper. There was definite interchange of current over the water system in three of these cases. The principal differences were the use of copper hot water tanks in three cases, and galvanized iron hot water tanks in the other two. Three of the houses, one of them with a galvanized tank and the others with copper tanks, obtained water from a 6-inch cast iron main within about 100 feet of its end. The other two houses, one each with a copper and a galvanized hot water tank, were at the dead-end of another 6-inch cast iron main one block away. These two subsidiary mains got their water at points less than 200 feet apart on a 12-inch feeder main. The water supply was derived from two separate deep well sources several miles apart at the opposite ends of the feeder main. The location of all these houses in relation to the sources was such that they would probably receive water from one source during part of the day and from the other source during the remainder of the day. One of the sources was treated with chlorine but not with lime, while the other source was treated with lime but not with chlorine. There is some evidence which would indicate that deep well waters may when they are soft and high in free CO_2, if not treated with lime, cause initial corrosion of copper tubing which would result in blue staining. These conditions may become more serious when the hot water is heated to too high a temperature. In one of the houses fed at the end of a dead end main, considerable trouble was experienced from rust and dirt in the water. This was definitely attributed to typical dead end main conditions which have been found from time to time in the Subcommittee's investigations.

The Subcommittee reported on an investigation made in the Middle West where blue water was involved, the condition being so serious as to cause discoloration of food cooked in the water. In this case the local authorities had called upon the power and telephone companies to remove all grounds from the water piping in the residence, and consideration was being given to extending this prohibition. All the grounds were removed, except the one from the frame of the motor driving the oil burner. The condition was reported to have cleared up temporarily following the removal of the ground, but recurred within about a month. At that time the house piping was thoroughly cleaned, after which the condition finally cleared up. During the interval between removal of the grounds and flushing of the piping, a change has been made in the treatment of the public water supply which reduced its iron content from about 2.2 to about .3 parts per million. This treatment of the water supply had been temporarily discontinued during the summer months. The house had been completed and first occupied about the middle of the summer. The conditions in this residence were investigated thoroughly and investigations were made at several other residences similarly equipped but where no complaints had been made of water conditions. Most of the other residences had been built for some while, in contrast to that where the complaint originated. In connection with the investigation the Subcommittee also made arrangements to have the grounds restored one by one and to have analyses made of the water by the State Health Department at two or three-week intervals to determine whether there was any recurrence of the condition complained of. At the time of the meeting of the Grounding Committee, none of the grounds had been replaced. However, advice received later showed that the grounds have been reconnected for some time and no adverse effects have appeared.

In one case involving a relatively new suburban house, a serious complaint of blue sediment in the water was brought to the attention of the Subcommittee. At the time of the investigation a glass of water drawn from the pipe showed substantial blue flakes of copper carbonate at the bottom. The water service pipe was about 250 feet long and the electric service was about 500 feet long from the transformer to the residence. The electric service was grounded at the meter to the water service in approved fashion and average interchange of current over the water service pipe was revealed. A modified fish trap with an 80 mesh strainer was installed at the house end of the water service in order to reduce the trouble, and to permit periodic determination of the amount of sediment collected. The amount of sediment fell off to nothing between the late summer and December of 1939. Up to the time of the meeting no sediment had appeared but in the latter part of August, 1940, sediment reappeared. In this case the water supply was treated with chlorine and lime, the latter by means of an unattended automatic liming equipment at the pumping station. It was reported that the lime treatment had been discontinued since June, 1940.

In this case a section of the service pipe was removed for examination and analysis. The interior of the pipe was found to be coated with non-adherent copper salts. It is of interest that at the

time of the removal of this sample of the service pipe the plumber reported sparking and electric shock. A subsequent investigation revealed that opening of the service pipe resulted in the development of a maximum of 10 volts between the house end and the street end of the piping during the starting of an electric washing machine. With a steady load of 10 amperes in the residence, the voltage across the open ends of the service pipe was 3 volts. This undoubtedly accounts for the sparking and electric shock reported.

The Subcommittee, in its report, again pointed out the unsatisfactory conditions which have been observed at the point of attachment of ground clamps to water pipes. Two general types of ground clamps have been observed, one, the copper strap type, and the other, a cast or wrought iron clamp, generally galvanized. The use of copper straps on galvanized pipes sometimes had led to corrosion of both the strap and the piping in the presence of moisture, due either to dampness in the cellar or condensation on the pipe during warm, humid weather. The moisture sets up a local electrolytic cell between the different metals present. Iron clamps on galvanized piping do not appear to have resulted in any adverse effects. However, the use of large cast or wrought iron clamps on copper tubing or on lead pipe has been a source of trouble due to electrolytic effects, and also mechanical damage to the pipe because of the massiveness of the clamp in comparison to the tubing to which it is attached. Improper installation of such clamps may result in crushing or deforming either copper tubing or lead pipe. The Subcommittee has discussed the development of a type of grounding connection which could be placed directly in the plumbing system at the time of installation, to which all electrical ground connections could be solidly made without any of the difficulties which have been observed with clamps.

Fundamental Laboratory Studies

The fundamental laboratory studies reported by the Technical Subcommittee were made to determine the polarization effects of alternating current on electrolytic cells. Using a 1/10 normal solution of sodium chloride for the electrolyte, tests were made where both electrodes were copper, both zinc, and also where one electrode was copper and one was zinc. The circuit was arranged so that various magnitudes of direct current and various magnitudes of alternating current either separately or superimposed would pass through the cell. Among the results found under this particular test set-up were:

Zinc electrodes polarize less than copper electrodes.

It required about 50 times as much alternating current as direct current to cause comparable polarization.

Summary

In its investigations the Subcommittee has observed differences in the chemical composition of water supply: in the nature of the permissible impurities in the copper tubing installed; in the number and arrangement of galvanic couples resulting from the more or less indiscriminate use of many different metals and variations in composition of the same metals; in the temperature of the hot water supply, in the rate and amount of water drawn from the mains; and in many other factors as well as the possible effect of stray current. It has not been possible thoroughly to develop all of the complex variables present in the different situations investigated and the Subcommittee's work has not progressed as rapidly as hoped for, due to its inability to obtain a sufficient number of cases for investigation. However, the report of the Subcommittee stated that in none of the cases investigated was there evidence to indicate that the flow of alternating current over water pipes or mains by itself has caused damage to the piping or to the water flowing in the pipes. However, the investigations have not progressed sufficiently to prove that such damage could not occur.

Future Program

Due to the complexity of the variables, the Grounding Committee has recommended continuation of the established program of investigating all complaints of contamination of water where grounding of electrical circuits is involved to determine if possible whether there is any relation in normal practice between superimposed alternating currents and effects on water pipes and the pipe contents. It also proposes to establish simple test set-ups where accelerated reactions might be obtained if such a relation does exist. These set-ups must be of such a nature as not to require continuous observation, but will be located in water plants or laboratories where occasional checks of the results can be made from time to time under the supervision of skilled personnel. It continues, however, to be important that all complaints should be investigated as promptly as possible, in order to expand the field experience and establish correlation among the various factors involved.

William W. Erwin

WILLIAM WHITEHEAD ERWIN, vice-president of the Consolidated Edison Company of New York, Inc., in charge of purchasing and stores, died Sept. 12 at his home in New York after a long illness. He was 62 years old.

Mr. Erwin, who had been associated with Consolidated Edison and its predecessor companies since 1900, was born in Albany, N. Y., on Feb. 26, 1878, and was educated in that city. He joined the New York Edison Company as a draughtsman, later becoming superintendent of construction.

He became chief operating engineer in 1918, and in 1925 was elected controller of the New York Edison Company and the Yonkers Electric Light and Power Company. In 1932 he was named vice-president of both New York Edison and the United Electric Light and Power Company. Upon the merger of gas and electric properties in the Consolidated Edison Company in 1936, he was elected vice-president of the new organization. He was a member of the Engineers Club.

At the funeral services held Sept. 13, Mr. Floyd L. Carlisle, chairman of the board, and other officers of Consolidated Edison served as honorary pallbearers.

Jay Clarence Barnes

JAY CLARENCE BARNES, advertising director of New Orleans Public Service, Inc., died suddenly of a heart attack on Aug. 15 at his country home at St. Francisville, La. His age was 50 years.

Mr. Barnes, who had been with New Orleans Public Service since 1924, was nationally known in the field of public utility advertising. He was a past president of the Public Utilities Advertising Association and had been head of the advertising and publicity section of the American Gas Association. In 1928 he served as president of the Advertising Club of New Orleans.

He had long been active in all major civic movements in New Orleans and

his activities in this field included: president, Young Men's Business Club; president, New Orleans Council, Boy Scouts of America; chairman of the publicity committee, Community Chest; chairman of the commanders council, Alvin Callender post of the American Legion; director, New Orleans Civic Symphony, and several carnival organizations, and work with the American Red Cross and the New Orleans Association of Commerce. His most recent accomplishment was as chairman of the Sugar Bowl drive to finance the enlargement of the Tulane Stadium.

Louis A. Ferguson

LOUIS A. FERGUSON, retired vice-president of the Commonwealth Edison Company, Chicago, and former president of the National Electric Light Association, died Aug. 25 in a hospital at Rhinelander, Wis., following an attack of intestinal influenza. He was 73 years old.

Mr. Ferguson was born in Dorchester, Mass., and attended Massachusetts Institute of Technology. After graduation he joined the Chicago Edison Company as an employee of the meter department and was promoted rapidly, serving successively as engineer of underground construction, electrical engineer and general superintendent. In 1902 he was elected vice-president of both the Chicago Edison Company and the Commonwealth Electric Company, and five years later when the two were consolidated as the Commonwealth Edison Company, he continued in the same capacity with the new organization, directing the operating, construction and electrical departments. He retired Jan. 1, 1936.

Mr. Ferguson was accorded national recognition for his contributions to the advancement of the electric light and power industry. In 1896, as electrical engineer for Chicago Edison, he proposed the plan of transmitting alternating current at high voltage with subsequent conversion to direct current by means of rotary converters, the adoption of which proved to be an important step toward the attainment of a more economical and convenient power supply.

In addition to his presidency of the NELA, Mr. Ferguson held the distinction of having served as president of two other major organizations of the industry, the Association of Edison Illuminating Companies and the American Institute of Electrical Engineers.

PERSONALS

JUSTIN R. WHITING, president, the Commonwealth and Southern Corporation, has been elected a member of the board of trustees of the Edison Electric Institute. The election of Mr. Whiting fills the vacancy created by the resignation of Wendell L. Willkie, whom Mr. Whiting also succeeded in the Commonwealth and Southern presidency.

WALTER G. MOORE, formerly vice-president of the Texas Power and Light Company, has been elected a director and vice-president of the Dallas Power and Light Company. He will have charge of commercial operations. A native Texan, Mr. Moore has been connected with electric utilities in the state since 1913, when he became manager at Paris for Texas Power and Light. In 1927 he went to Dallas as assistant commercial manager and in 1928 became commercial manager. He was made a director and vice-president in 1937. Mr. Moore is a past president of the Petroleum Electric Power Association and served two years as chairman of the EEI Air Conditioning Committee.

ROSCOE E. BAILEY, for fourteen years manager of the Park City division of Utah Power and Light Company, has been appointed manager of the southern division. He joined the company in 1914 as a power salesman and was later promoted to superintendent of power sales, then to assistant to commercial manager.

ROBERT E. LOVEJOY, general line foreman of the Fitchburg (Mass.) Gas and Electric Light Company, has been appointed superintendent of electric distribution, succeeding the late Frank D. Powers. He was formerly manager of the electric light department of Lunenberg, Mass.

WALTER H. PROESCHOLDT is leaving the Iowa Electric Light and Power Company, Cedar Rapids, after more than fourteen years' service, to take a new position as assistant chief engineer for the Quaker Oats Company in Chicago. After beginning with Iowa Electric as an electrical inspector, Mr. Proescholdt was made a meter auditor and later transferred to engineering work. Recently he has been engaged in engineering studies for the management.

HARRY K. HUBENTHAL, for the past 13 years assistant electrical superintendent of the Shawnee District for the Oklahoma Gas and Electric Company, has been appointed electrical superintendent of the Arkansas division, succeeding L. J. Noble, retired. Mr. Hubenthal joined the company 18 years ago.

WRIGHT B. THOMPSON, chief inspector, sales department, Detroit Edison Company, has retired after 54 years' service with the company. He is 80 years old. In 1886 Mr. Thompson entered the employ of the newly formed Edison Illuminating Company and installed many of Detroit's first electric lights. After doing installation work for several years, he became head of the meter department.

TED B. FERGUSON, vice-president in charge of advertising for the Texas Power and Light Company, has assumed larger duties as vice-president in charge of advertising and new business. He has been with Texas Power and Light fourteen years and had served as salesman, district manager and advertising manager before his elevation to a vice-presidency. He has been active in the Dallas Electric Club and the Dallas Advertising League.

J. S. JOHNSTON has retired from his position in the pole inspection department of the West Penn Power Company, Pittsburgh, after 39 years of continuous service with the company. He began his career with the West Penn system in 1902 as foreman of pole and line construction for the Pittsburgh, McKeesport and Connellsville Railways. In 1905 he moved to Greensburg as foreman of line construction, in 1909 became district superintendent of Scottdale and Mt. Pleasant, and in 1915 went to Wheeling as territorial superintendent of light and power. He moved to the securities sales department in 1923 and in 1932 was transferred to treasury, joining the operating department the next year. West Penn's first transmission line and its first high-tension tower were built under Mr. Johnston's supervision.

NEW PUBLICATIONS OF THE INSTITUTE

TEST SPECIFICATIONS FOR HOUSEHOLD ELECTRIC RANGES

E.E.I. Pub. H-1. A report of the Joint Committee of the Edison Electric Institute and the National Electrical Manufacturers Association, 10 pages. Price 20c. to members and their employees; 50c. to non-members in the U.S.A.; 60c. to foreign countries.

This specification is intended to establish a uniform testing procedure to make possible the determination of the performance of household electric ranges in terms of safety, effectiveness, durability and convenience. It is based upon available investigations, test and field experience to date, and is subject to revision as further experience and investigation may show to be necessary or desirable.

The report of necessity includes some elements of construction and material, nevertheless, it does not preclude ingenuity of design or improvements, and it is not to be considered as a measure of quality beyond compliance therewith.

SUGGESTIONS FOR SPECIFICATIONS

These two "Suggestions for Specifications" are the first of a series to be issued by the Meter and Service Committee of the Edison Electric Institute covering meters, metering equipment, and services. They are intended for use by member companies as an aid in preparing their own standard specifications for the purchase and use of this equipment. It is recommended that the provisions of these "Specifications" be used in so far as feasible, since they represent the consensus of a large majority of the industry as evidenced by their approval by the Meter and Service Committee. They have been prepared after a considerable amount of cooperative study between representatives of the power companies and also of meter manufacturers. It is believed that a general use of these Standards will do much to promote uniformity in meters.

Standard Dial Constants for Alternating Current Watthour Meters

E.E.I. Pub. MS-1. A report of the Meter and Service Committee, Edison Electric Institute, 4 pages. Price 10c. per copy.

The development of self-contained watthour meters has provided an extended load range which needs to be considered in relation to dial constants to be used to avoid a complete register turnover between monthly indexing periods. The subject has been carefully studied by the Meter and Service Committee and standard constants of 1, 10, and powers thereof for use with four dial registers have been developed. For the purpose of eliminating dial constants of 10 a standard five dial register has also been developed.

Coordinated and Standardized Low Voltage Metering Current Transformers

E.E.I. Pub. MS-2. A Report of the Meter and Service Committee, Edison Electric Institute, 4 pages. Price 10c. per copy.

The increased use of low voltage networks and increasing capacity of all low voltage metering required the development of a standardized line of current transformers. Transformers are rated at 600 volts and have capacities of 200/5 amperes, 400/5 amperes, and 600/5 amperes. Standards for overload rating, temperature rise, burden, accuracy, polarity, terminals and dimensions have been developed.

Better Relations Through Personalized Service

(*Continued from page* 430)

that he shall not be wanting in the best property of all—friends?"

Some Companies have figured it out. One Division Manager states, "* * * *getting more for this dollar than any dollar we have ever spent.*" And another says, "* * * *wish I had four more men doing this work instead of selling merchandise.*"

Another states, "* * * *Personally I am approached in the street and in the office by customers who have told me how pleased they were to find out more about our Company and the service we render, and in every case they compliment us on this method of visitation. We will gain in revenue and friends by the personal contact with the housewife and I am sold on the idea that it is worth all it costs.*"

Money spent for humanized public relations is a premium on "perpetuity" insurance for the Company and the industry. Like other insurance we are likely to lose sight of its value except in a crisis when we either meet with disaster for lack of it or progress because of it. Whether or not the particular way in which the "premium" is spent is the best way is a matter for experienced judgment to decide.

Money spent in the Customer Service manner of improving relations is meeting with the approval of more and more executives who know the value of *personalized service.*

(Part II of this article, a sample program outlining the personalized service program in detail will appear in the October issue)

Plans for National Commercial Cooking Conference

MORE than 150 utility executives and commercial cooking sales specialists are expected to attend the Fourth Annual National Commercial Electric Cooking Conference to be held at the Hotel Knickerbocker, Chicago, Oct. 10.

The Conference this year is being held as usual in conjunction with the National Restaurant Association Convention and National Restaurant exhibition. J. F. Porter, Jr., vice-president of the Kansas City Power and Light Company, is chairman of the Conference and chairman of the National Commercial Electric Cooking Council.

Speakers on the Conference Program will include I. S. Anoff, President, Food Service Equipment Industry, whose subject will be "The Equipment Dealer Looks at Electric Cooking"; Henry Dooley, associate editor of *Electrical World*; W. A. Tadlock, Georgia Power Company, Atlanta, and C. E. Greenwood, commercial director, Edison Electric Institute.

Christine R. Pensinger, Illinois State Food and Textile Advisor, will speak at the Conference luncheon on, "A Woman's Viewpoint on Commercial Electric Cooking." Other high points of the program include talks by L. Van Haften of Walgreen Drug Co., Chicago; Guy C. Smith, advertising manager, Cumberland County Power and Light Company, Portland, Me., who will speak on, "Promoting Commercial Cooking in Small Communities;" and C. F. Loeffel, of *Restaurant Management* and *Hotel Management* magazines.

This year's Conference will include a round-table discussion period exclusively for Utility commercial cooking sales specialists under the chairmanship of Gordon Koch, Kansas City Power & Light Co.

National Defense Is Keynote of P. E. A. Meeting

THE electric utilities of Pennsylvania, mindful of their responsibilities to the public, are well prepared to meet the demands that will be made upon them by the national defense program, B. P. Carey, president of the Pennsylvania Electric Association, told 600 delegates to the association's thirty-third annual convention held at Bedford Springs, Sept. 5, 6 and 7. Pennsylvania produces one-fifth of all the energy resources of the United States, Mr. Carey said, developing at maximum output more energy than all the potential hydroelectric power of the country.

"Most, if not all, our national problems are economic problems, which in turn are pure business problems," Mr. Carey declared. "We cannot foretell with any accuracy what this year may bring forth. The best we can do is tighten our belts and be prepared not alone for the everyday business problems, but for any emergency, state, national, or even international, which may arise."

E. C. Stone, vice-president, Duquesne Light Company, was elected president of the association to succeed Mr. Carey. In accepting the office Mr. Stone declared that in the coming year, "There will probably be further important developments in those fundamental matters with which we have been so much concerned in recent years in the fields of public relations, governmental regulations, taxation and so on, and we must continue to give service and constructive attention to them. But to those of us who are directly concerned with the various operating activities of our companies, I believe that the immediate future holds out more constructive opportunity than we have had in many years."

The electric power industry has been able to live and grow only because of economies made possible by contributions from every branch of the engineering profession, A. G. Butler, Duquesne Light Company, declared. As long as these contributions are made, he said, "the industry may be able to keep ahead of increased taxes and additional commission expense, and at the same time carry out its major objective, which is to furnish more and more power at lower and lower rates."

H. P. Liversidge, president, Philadelphia Electric Company, was not able to be present at the convention, but his prepared address was read by H. B. Bryans, vice-president of Philadelphia Electric. Mr. Liversidge declared that the public has a misconception of the operations of the electric utility business and that this has been increased by misstatements and deliberate falsehoods. Discussing the progress of the industry, Mr. Liversidge said, "If we are to maintain our economic place in business it will be because of a continuance of good management, efficient operation and aggressive sales effort."

Charles W. Kellogg, president, Edison Electric Institute, discussed "The Engineer's Place in the Industry." Because the electric utility business involves an investment in fixed plant about eight times as great per dollar of annual gross revenue as for the average industrial concern, problems of design assume more than normal importance in planning plant extensions, he said. "Errors in design take much longer to live down in an industry where plant is so predominant. Hence, faulty engineering is an especially serious defect with a utility company."

Professor W. H. Timbie, of Massachusetts Institute of Technology, urged engineers to consider the economic and sociological side of the effects of new inventions and technological progress. The charge that the engineer is responsible for creating machinery which causes overproduction, is bunk, he said.

Two national legislators were guest speakers on the convention program. Senator H. Styles Bridges of New Hampshire spoke on "America at Home and Abroad," and Representative J. William Ditter of Pennsylvania discussed "Fifth Columns."

Other speakers were Dr. Allen A. Stockdale, National Association of Manufacturers, whose subject was "The Future of America;" Dr. Amos E. Neyhart, who talked on "Teaching the Old Driver New Tricks;" Henry W. Morton, Detroit Edison Company, on "New Tools for Selling Old Wiring Markets," and Dr. William Mather Lewis, president, Lafayette College, on "A Broader View of National Defense."

At a special women's session held Thursday morning, H. S. Metcalfe, West Penn Power Company, discussed "The Spirit in Which to Work."

In addition to electing Mr. Stone as its new president, the association chose three vice-presidents for the coming year: M. H. Parkinson, Pennsylvania Power and Light Company; L. B. Round, Pennsylvania Power Company, and E. H. Werner, Metropolitan Edison Company. H. M. Rankin, Metropolitan Edison Company, was named a new member of the Executive Committee, of which retiring President Carey also becomes a member. Executive Committee members re-elected were: I. L. Craig, Philadelphia Electric Company; P. H. McCance, Duquesne Light Company; C. L. Peirce, Jr., Hubbard and Company, and P. H. Powers, West Penn Power Company.

C. A. Dougherty, Pennsylvania Edison Company, was made chairman of the engineering section and H. S. Fitch, West Penn Power Company, vice-chairman.

Pennsylvania Edison Company, presenting a record of only two lost-time accidents in 1,500,000 exposure hours, won the safety award for companies of more than 500 employees. Metropolitan Edison Company placed second and Duquesne Light Company third.

Among companies having less than 500 employees, Edison Light and Power Company was first, South Penn Power Company second and Glen Rock Electric Light and Power Company third.

Mid-Year Meeting of Maryland Utilities

ELECTRIC utility company representatives from Maryland and the District of Columbia attended the mid-year meeting of the Maryland Utilities Association at Ocean City, Md., the first week of September.

The load-building value of the frozen-food industry was the subject of a talk by H. W. Sterling, superintendent of plants, Eastern Shore Public Service Company. Dr. H. C. Byrd, president, University of Maryland, told how the university cooperates with public utilities. Amos E. Neyhart, administrative head, Institute of Public Safety of Pennsylvania State College, discussed "Humanizing Driver Education and Training." A special speaker at the banquet was James E. Gheen, New York.

H. G. Haydon, Potomac Electric Power Company, is president of the association.

Bids Wanted on Air-Conditioning and Pumping Equipment of World's Fair Utilities Exhibit

THE air-conditioning equipment and the waterfall pumping equipment now installed at the Forward March of America exhibit building at the New York World's Fair are being offered for sale by the Electric Utilities Exhibit Corporation, operators of the exhibit, for delivery soon after the close of the Fair on October 27, when the building will be demolished.

No price has been established. Bids are asked on the equipment as now installed, f.o.b. the building, for removal. The air-conditioning equipment and the water pumping equipment are offered as units, each with its auxiliary apparatus. Proposals on this basis should be sent to the Electric Utilities Exhibit Corporation, World's Fair, N. Y.

The corporation also has for sale 24 exhaust fans and motors, ranging in size from 1/6 hp to 1½ hp, full description of which will be furnished on request. Description of the air-conditioning and pumping equipment follows:

AIR CONDITIONING SYSTEM

Refrigeration System

4—Westinghouse Type CLS-1320 Condensing Units each consisting of vertical 8 cylinder, single-action, direct-connected, hermetically-sealed compressor, nickel-iron crankcase, cylinders cast integrally with crankcase, 3 in. bore, 3½ in. stroke, cast iron pistons fitted with two compression rings and one oil control ring, drop-forged steel counter-balanced crankshaft, 5 main bearings, cylindrical wire mesh strainer, water cooled condenser. 2½ in. pilot operated water valve automatically regulates flow of condenser cooling water to maintain constant condensing pressure. A safety pressure cut-out switch stops unit when discharge pressure exceeds 175-lbs. or suction pressure drops below 10-lbs. per square inch.

Motors

Each of the above four compressors is operated by a 40-HP, 1150 RPM, 60 Cycle, 208-Volt (or 220 or 440 Volt) Motor.

Starting Equipment

To start the above four motors there are provided four Westinghouse AC Magnetic Controllers, 40-HP, 208-Volts, 3-Phase, 60 Cycles. The AC Switch Magnet operates at 208-Volts, 60-Cycles.

In addition to the four 40-HP Compressors, there is an additional Westinghouse Type CLS-850 Condensing Unit with vertical 6-cylinder single-action direct-connected hermetically-sealed compressor, nickel-iron crankcase, cylinders cast integrally with crankcase, 3 in. bore, 3 in. stroke, cast iron pistons fitted with two compression rings and one oil control ring, drop-forged, counter-balanced steel crankshaft with four main bearings, cylindrical wire mesh strainer. 2-inch pilot operated valve automatically regulates flow of condenser cooling water and maintains constant condensing pressure. A pressure operated switch stops the unit when discharge pressure exceeds 175-lbs. or suction pressure drops below 10-lbs. per square inch.

Motor

25-HP, 1150 RPM, 60-Cycle, 208-Volts (or 220 or 440 Volts).

Starting Equipment

Westinghouse No. 4-DN Line Starter separately wall-mounted.

Cooling Coils

6—Westinghouse Heat Transfer Surfaces, Type WE Evaporators.

Circulating Pump

Dayton-Dowd Centrifugal, Size 5x6C-SLH, 800 GPM, 50-foot head, 1750 RPM.

Circulating Pump Motor

Westinghouse Type CS-Inductor Motor, 15-HP, 3-Phase, 60-Cycles, 208-416-Volts; 38.4-19.2 Terminal Amperes, 1740 RPM, 2-Volt Series and Parallel Star Winding.

Starting Equipment

No. 2 Westinghouse DN-Line Starter.

PUMP EQUIPMENT

Pump

1—Dayton-Dowd, 24 x 20 in. Type A-25 Centrifugal Pump with carbon steel shaft, semi-steel nickel impeller, otherwise bronze fitted for a capacity of 15,000 GPM against approximately 45′ THD at 690 RPM, complete with extended bed-plate and flexible coupling to the driving motor.

Motor

1—Westinghouse 200 HP, 208-Volt, 60-Cycle, 3-Phase Motor, rotor circuit, 415-Volts between rings and 217 Amperes per ring, designed to carry full load 24 hours per day with a temperature rise not exceeding 40 deg. C., Style 8-P-643, Serial No. 1-s-8-P-643.

Starting Equipment

The Motor is started with a Westinghouse AC Magnetic Controller 200 HP, 208-Volts, 3-Phase, 60 Cycles, SEC Volts 415, SEC Amps. 217, Style No. 21-W-984. AC Switch Magnet operates at 208 Volts, 60 Cycles.

Circuit Breaker

Associated with the Magnetic Controller is a U-RE-LITE Circuit Breaker.

Priming Pump

Nash-Hytor Vacuum Pump, Size MD-57.3, 1730 RPM.

Priming Pump Motor

The Priming Pump is operated by a Westinghouse 1½ HP Motor, 208-Volts, 60 Cycles, 4.3 Terminal Amperes, 1750 RPM, full load full time heat rise of 43 deg. C.

CONVENTIONS AND MEETINGS

SEPTEMBER

23-25 Controllers Institute of America, Waldorf-Astoria Hotel, New York, N. Y.
25-27 Indiana Electric Association, French Lick Springs Hotel, French Lick Springs, Ind.
Meter and Service Committee, EEI, Hotel President, Kansas City, Mo.
26-27 The Empire State Gas and Electric Association, Westchester Country Club, Rye, N. Y.
30-Oct. 3 Sales Executives Conference, AEIC, The Homestead, Hot Springs, Va.

OCTOBER

4 General Sales Committee, EEI, The Homestead, Hot Springs, Va.
4-5 Public Utilities Association of West Virginia, The Greenbrier, White Sulphur Springs, W. Va.
7-8 Prime Movers Committee, EEI, William Penn Hotel, Pittsburgh, Pa.
7-8 Electrical Equipment Committee, EEI, Jefferson Hotel, Richmond, Va.
7-10 American Gas Association, Atlantic City, N. J.
7-11 National Safety Congress, The Stevens Hotel, Chicago, Ill.
10 4th Annual Commercial Electric Cooking Council Conference, Knickerbocker Hotel, Chicago, Ill.
14-15 American Society of Heating and Ventilating Engineers, Houston, Texas.
14-16 Transmission and Distribution Committee, EEI, Henry Grady Hotel, Atlanta, Ga.
14-17 International Municipal Signal Association, Roosevelt Hotel, Jacksonville, Fla.
21-23 National Electrical Contractors Association, George Washington Hotel, Jacksonville, Fla.
24-25 Accident Prevention Committee, EEI Headquarters, 420 Lexington Ave., New York, N. Y.
27-Nov. 1 National Electrical Manufacturers Association, Waldorf-Astoria Hotel, New York, N. Y.

NOVEMBER

11-12 Wisconsin Utilities Association, Electrical Section, Commercial and Technical Divisions, Pfister Hotel, Milwaukee, Wis.
14-16 Annual Commercial Conference, Southeastern Electric Exchange, Atlanta, Ga.

DECEMBER

2-4 Fourth Annual Joint Accounting Conference, AGA-EEI, Book-Cadillac Hotel, Detroit, Mich.
2-5 American Society of Mechanical Engineers, New York, N. Y.
9-11 National Warm Air Heating and Air Conditioning Association, Detroit, Mich.
10-12 National Association of Railroad and Utilities Commissioners, Miami, Fla.

JANUARY

15-18 American Society of Civil Engineers, Baltimore, Md.
27-29 American Society of Heating and Ventilating Engineers, Kansas City, Mo.
27-31 American Institute of Electrical Engineers, Philadelphia, Pa.

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